IMPROVED SLEEPING-CAR BERTH.

The annexed engravings represent a novel guard for sleeping-car berths, recently patented by Mr. Frederick C. Hills, of Missouri Valley, Iowa. It is intended to prevent sleepers from rolling out of the upper berths of cars and vessels, and to prevent car berths from closing up and shutting the occupant in, in case of accidents. Fig. 1 is a perspective view of a berth ready for occupancy, and Fig. 2 is a transverse section, showing the bed in different positions. The berth, A, is hinged in the usual way, and supported at each end by a jointed and pivoted link, B, which permits of closing it when the berth is not in use. To the front of the berth is

HILLS' SLEEPING-CAR BERTH.

pivoted a guard, C, formed of horizontal rails and end pieces. This guard, when the berth is occupied, is turned into an upright position, but when the berth is not used the guard is folded down and the berth thrown up into the pocket in the usual way. In case of an accident, when a berth is occupied and the guard is up, the upper ends of the end pieces of the guard abut against the stops or lugs fixed in the berth pocket, thus preventing the closing of the berth and protecting the sleeper. This invention will be appreciated by those who are often upon the road and are frequently obliged to occupy an upper berth.

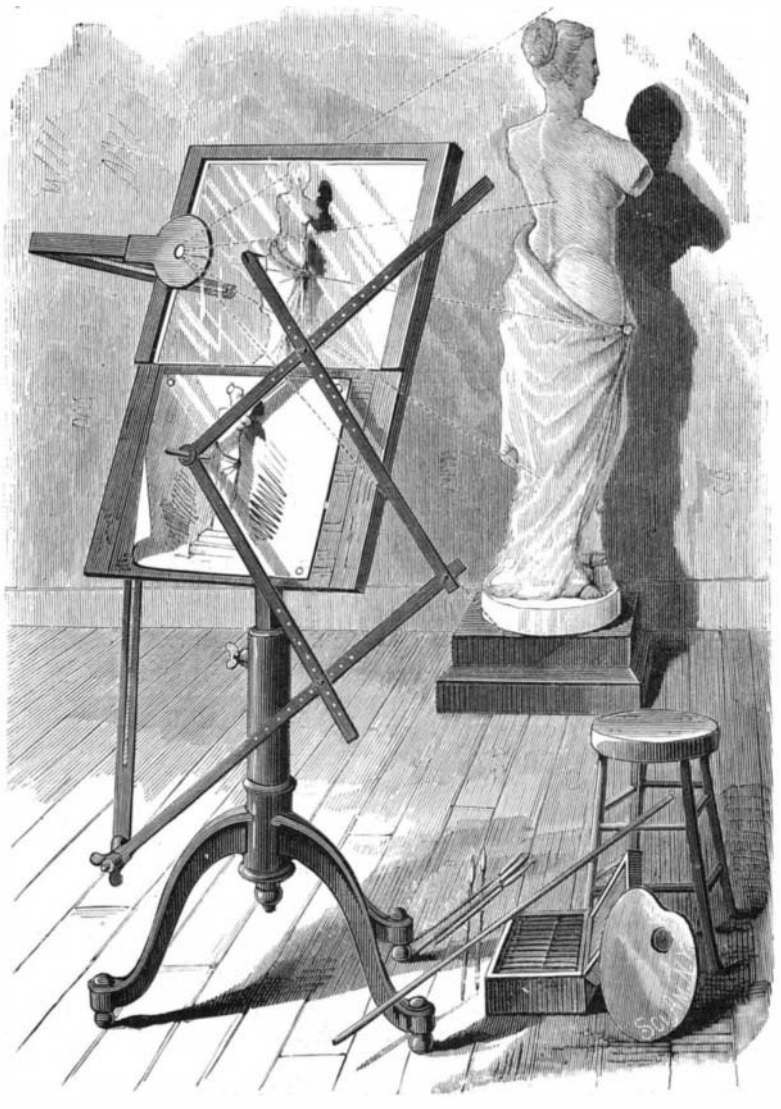
NEW PERSPECTIVE DRAWING APPARATUS.

While the artist can, in an off-hand way, sketch a perspective which will appear perfect to the eye, and which, in the majority of cases, will be found nearly if not quite perfect, it is only the artist dealing with an artistic subject that can do this. The draughtsman who is required to make all kinds of drawings, not only quickly but accurately, often finds it an exceedingly difficult matter to make a perspective drawing without some kind of mechanical aid.

The instrument shown in the accompanying engraving is intended for drawing perspectives easily and accurately. It is the invention of Mr. George Rosquist, Brooklyn, N.Y.

The drawing table is pivoted to a standard so that it may be inclined at different angles, and it is provided with an adjustable bar that supports one arm of an ordinary pantograph. The lower half of the table, which is wood, is designed to receive the paper on which the drawing is made. The upper half of the table is of transparent glass, and a perforated sight piece is supported by a right angled arm directly in front of the middle of the glass. The tracing point may be moved along the surface of the glass, and the pencil moves in the same way over the paper on the lower part of the table.

The object to be sketched is placed a suitable distance from the instrument, and the eye is placed at the aperture of the sight piece; the outline of the object is followed by the tracing point of the pantograph, the glass affording a guide for the point and keeping the pantograph in a true plane. As the tracing point is moved the pencil carried by the pantograph over the paper traces the outline of the object, either larger or smaller than it appears through the sight piece. After the sketch is finished the drawing table may be turned down into a horizontal position, when the sketch may be inked in the usual way.



ROSQUIST'S PERSPECTIVE DRAWING APPARATUS.

Steam Fire Engine Improvements.

Mr. Blinn Converse, of St. James, Minn., a locomotive engineer on the St. Paul and Sioux City Railroad, has invented and patented an apparatus for the purpose of generating steam with great rapidity. It consists of a circular exhaust fan, which is caused to revolve with immense speed by clockwork. The fan is placed in the upper portion of the smoke stack, and it thus causes, when in motion, an immense and powerful current of air to be drawn through the fire below. And therein lies the whole secret of its success, which was amply proved. The boiler of the engine, to which the apparatus was attached, having been filled with cold water, and the fan having been set in motion and the fire lit, the following was the result: The steam gauge started to move in three quarters of a minute; in one minute two pounds of steam were generated; in one and a half, eighteen pounds; in three and a half, thirty-nine pounds; and in four minutes, forty pounds. Almost at the first revolution of the fan, the flames were drawn clear out of the stack. Under ordinary circumstances it would take about ten minutes to raise the last steam pressure above given from cold water.

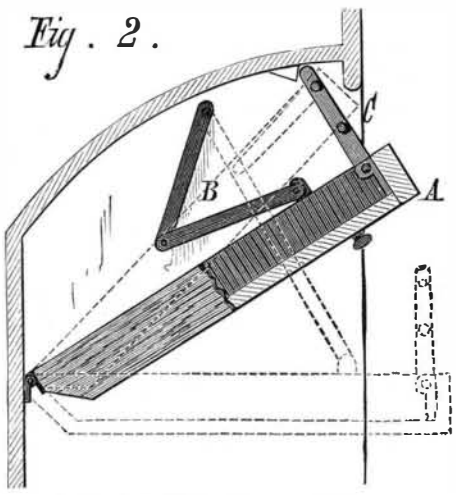
During a recent trial of a new steamer at Milwaukee, of the Ahrens make, in four and a half minutes after lighting the fire, water cold, the steamer was throwing water 100 feet, and in ten minutes 293 feet. A vertical 1⅜ stream was maintained to a height of 240 feet.

The Philosophy of Physical Science.

Professor Trowbridge, of Harvard University, in a recent lecture before the Lowell Institute, prefaced his remarks by giving a list of books on topics touched upon in the lecture of that evening. The Boston *Daily Advertiser*, from whom we quote, says: They were: Mill's "System of Logic," Jevons' "Principles of Science," Herbert Spencer's "First Principles of Philosophy," Huxley's "Physical Conditions of Science," and Professor Wundt's "Open Letter on Spiritualism." To use the words of Lord Bacon, said the lecturer, some of these were to be tasted and others swallowed. Physics was a term recently substituted for natural philosophy, as being more comprehensive. The most complete definition of physics would be that it meant motion in contradistinction to rest. There was no such thing as rest, in a scientific man's mind. So considered, physics was the noblest of sciences. There was no such thing as rest, in a physical sense. Motion was a word that called up a definite impression to us all. Motion was both seen and unseen, and vibrations sensible to the ear were insensible to the eye. This was illustrated by rubbing a bar, the friction causing a sharp tone and generating power enough to set a ball in motion. Sound, electricity, and magnetism were also forms of motion.

Professor Trowbridge then spoke of the laws of physics, and said he would not discuss the relations between physics and physiology. He would endeavor to promote scientific thinking. Definite thinking on one subject led naturally to definite thinking on another subject. In speaking of the philosophy of physics, he said that every man and woman philosophized in some way and to some extent. The philosophy of physics entered upon all subjects. It was the investigation of the physical laws of the universe, and was the result of the investigation of the truth by means of evidence. It was based upon the laws of causation. There were unthinkable regions into which it could not enter. Metaphysics were contrasted to scientific methods of thought, which left off diving into the unfathomable. Conclusions were reached by processes of induction and of deduction. The former process was that followed by the lawyer. The more nearly a science approached a deductive form the more nearly perfect did it become. The science of electricity was rapidly changing from an inductive to a deductive science. By the possession of good means of deduction a man might be saved half a lifetime spent in experimenting. It would not do to rely upon the old adage, "Seeing is believing," for in reality seeing was not believing.

The importance of unknown factors was to be taken into account in all investigation. The able man would abandon a theory, but the ignorant man would not, and the latter imagined that the scientist held to his theories in the same blind way that he himself did. There was a strong undercurrent of credulity and superstition running through all classes of society, even the highest. There were three classes of thinkers—persons who could only think from A to B, those who could think back again from B to A, and the rarer



TRANSVERSE SECTION OF SLEEPING-CAR BERTH.

class who could think both these ways, and, so to speak, at right angles to them.

Professor Trowbridge then spoke of various forms of delusions into which people led themselves and were led by following unscientific methods of thought. It was possible for a man to construct a motor so that by means of minute concealed clockwork—under the table, for instance—it would run for a considerable time and appear to gain its power from permanent magnets. By restricting investigation to the motor when placed in four or five different positions only, places where the secret mechanism was concealed, persons were made to believe in the most wonderful things. Thus had many impostors with motors, clairvoyance, etc., obtained credence. In closing, Professor Trowbridge illustrated the ideas of infinite magnitude and infinite minuteness by contrasting the extent of the universe with the quadrillion molecules held in a sealed glass tube.

MECHANICAL INVENTIONS.

Mr. Daniel M. Holmes, of Arlington, N. J., has invented an improvement in cake machines, for which letters patent Nos. 174,244 and 188,366 were granted February 29, 1876, and March 13, 1877, respectively, to the same inventor. The invention consists in the combination of tubular cutters and conical flanged heads with the bottom of the discharge compartment of the dough box. Mr. Holmes has also patented other improvements intended to facilitate the discharge of the cakes from the cutters.

An improved fish scrap elevator, patented by Mr. Samuel P. Hedges, of Greenport, N. Y., which consists, essentially, of an upright frame supported on wheels, and carrying a bucket elevator, to which motion is imparted by the action of the driving wheels, by which the fish scrap, etc., is removed from the drying platform, and elevated and delivered into an elevated hopper fixed on the back of the machine. The hopper is provided with a device to gauge and cut off at any time from the superincumbent mass a quantity of the material sufficient for a cartload.

Mr. Charles D. Judd, of Bridgeport, Conn., has patented an improved machine for tapping water and gas mains, by means of which the main may be drilled and tapped and the valve inserted without allowing the gas or water to escape.

Mr. James F. Wise, of Wadley, Ga., has invented an improved sand band for the inner end of the hub of a vehicle for protecting the collar, axle arm, and box from sand and dirt, which are liable to get in between these parts and wear them. It consists in combining a sand band having a right angular shank with a shouldered or recessed axle and a clip in such a manner that the sand band shall be firmly held between the shoulder on the axle and the collar of the axle journal, and the joint formed between the axle and the sand band shank shall be covered and concealed by the clip which secures he latter.

High and Low Grinding—New Process Flour.

The difference between high and low milling is exactly this. In low milling the reduction of wheat to flour is effected in a single grinding, the aim being to produce as much flour and as little middlings as possible. The speed of the running stone is considerably faster in the old process than it is in the new. If the stones are in proper dress, evenly balanced and adjusted, a large proportion of bran and gluten coats may be obtained without disintegration, but it is very often the case, particularly where a proper adjustment is not had, that a large amount of bran is ground with the flour. This passes through the bolts, and the result is dark flour. High milling is the opposite of low milling, the grain being reduced step by step. Starting with the pointed kernels, we have with each grinding three products. First, we have coarse fragments, with much bran attached; then less coarse fragments, with less bran attached; and finally, minute fragments, with little or no bran attached. These are separated from each other by purifying machines. Each of these products is again subject to grinding, and again sorted into grades, and so on until the last traces of the white interior of the berry have been separated from the dark hull and graded.

Although not by any means a new process, its introduction into this country is so recent that it is new to us, and therefore the term "new process" is not a misnomer. This process has been in use in Austro-Hungary for seventy years and upward, and a similar method was known in France thirty years ago. Even in the State of New York the purification of middlings has been known as far back as 1852. In 1850, John Laumeister, a German miller, built a machine for cleaning middlings or farina at Janesville, N. Y., and put it in successful operation. A perforated sheepskin was used as a sieve, and a current of air forced through the farina as it lay on the sieve carried off all the light stuff. In 1852 the proprietors commenced grinding the farina into flour, and from that time to 1864 it was used and sold as substantially what is now known as "new process flour." It is claimed for the new process that there are sixteen more pounds of flour produced from the quantity of wheat formerly used in producing a barrel, and that the flour is of a vastly superior quality. Another advantage claimed is that it makes a superior flour from spring wheat, which heretofore produced an inferior flour, and by this feature alone has made an important commercial change in different sections of the country as wheat bearing regions. Under the old process of making flour the winter wheat furnished by all odds the best article. This was obtained only in its best condition from the northern tier of the Southern States, or the extreme southern parts of the Northern States. Virginia, Kentucky, and Missouri furnished the bulk of the wheat making the best flour, and it commanded a higher price in the market than the flour of the Northwest. Now, by this new process, spring wheat makes a better flour than can be made with the winter, and commands a higher price in the market than the heretofore best kind from winter wheat. This lifts the Northwestern or spring wheat growing States to the front rank as flour producing States, and adds correspondingly to the value of all the property in them.

It is easy to account for the reason that high milling chooses Minnesota as its favored seat. The wheat in that State was mostly hard, flinty spring wheat, which made an inferior flour. In 1871, a Frenchman by the name of La Croix, a miller, happened to be in Minnesota, and introduced a machine previously known in France by the name of the Perrigault machine, which was a success from the beginning. Thinking there might be a still better machine, one was found in France, known as the "Sasseur Mécanique," invented by a M. Cabancs. As under the old process it was important to get as little middlings as possible, so under the new process the wheat is ground coarser, or, as it is technically called, "higher," in order to get as much middlings as possible. The slower grinding necessitates more stones, while the cleansing process calls for an addition of bolting capacity, which, with the purifier, embraces all the additional machinery required. No additional power is required, as a diminution in the speed of the stones gives all the power necessary for the extra stones. Granulation being the great principle of the new process, we must naturally look to the wheat grain for the facts which render granulation possible. The constituents of the wheat grain are in the form of granules or cells. Inside of the bran are the gluten cells, which contain the most nutritious constituents of the berry, and next beyond the starch granules. The principle in this system of grinding is to separate the granules from the cells with as little flour as possible, and then purify them with a blast of air by blowing away all the fine particles of flour. Under this system the cells are not destroyed, but simply disintegrated, and are supposed to maintain their individual forms the same as when locked up in the berry. This, to the advocate of new process milling, is the *Ultima Thule* of the art; but the writer cannot understand how a single granule can possess any more virtue in itself than if it was ground up with the gluten in the old way, or when it was an integral atom of the wheat berry.

At the present writing both processes have their advocates. Some claim that new process flour, while looking white and nutritious, must necessarily lack in good bread-making qualities. Our chemists tell us that immediately within the bran is the most important constituent, as it contains phosphates and nitrogenous ingredients, out of which the digesting and assimilating apparatus elaborate all the important tissues and organs of the body. Now, if all these are taken away, the bread must be less nutritious, and therefore of a poor quality, no matter how white or inviting it looks. Now, as the "new process" miller does not desire to get the most flour, but the most money, out of the wheat, he does not care to clean the bran; by running close so as to do this would interfere seriously with his object, and would place him under the necessity of grinding instead of granulating, and from this it may be inferred that it is the color rather than the quality of the flour the miller seeks. There is little if anything gained in this or any other process, no matter how white the flour may be, that does not save the best of the grain for the good of man.—*Miller's Journal.*

Correspondence.

Edison's Electrical Generator.

To the Editor of the Scientific American:

I notice in your last issue a communication from a gentleman named Weston denying certain results which I had stated to the writer of the criticised article regarding the efficiency of my dynamo-electric machine. His statements are without sense or science, and plainly originate from one who does not understand the laws which he pretends to set forth. I append the report of Mr. Upton, my assistant, who has made all the measurements with the Faradic machine.

T. A. EDISON.

Menlo Park, N. J., October 23, 1879.

MR. EDISON: I have read very carefully the communication of Mr. Weston, which you handed me to report upon. It is impossible that the statement quoted by him, that your machine delivers nine-tenths of the electrical energy outside, is mathematically absurd, when it has been found to be practically true.

The assertion that a machine working with nine times more external than internal resistance must be "capable of increasing its own electromotive force nine times without an increased expenditure of power" is utter nonsense. Mr. Weston has evidently confounded the obtaining of a maximum of current with the obtaining of a maximum of economical efficiency. A Faradic machine with a constant field may be considered electrically, when running at a fixed speed, as a battery with a certain E. M. F. and internal resistance. Your machine, for example, has 130 volts electromotive force and about half an ohm internal resistance. According to the reasoning in the letter in question it would be mathematically absurd to connect a battery with a resistance nine times greater than itself, and "destructive of the doctrine of the conservation and correlation of forces," since doing this with a battery is exactly similar to what you have done with your machine in the case mentioned.

To express the results with equations, the outside work may be taken as equal to $E^2 (r + R)^{-2} R$. This will be a maximum when the equation of condition, that the first differential coefficient is equal to zero, is satisfied, or $-2 E^2 (r+R)^{-3} R + E^2 (r + R)^{-2} = 0$, which is the case when $R = r$. This shows the maximum is obtained when the external resistance is made equal to the internal. An experimental proof of this was given in a recent number of *La Lumière Electrique.* For example, in your machine there should a maximum theoretically when R equals 0·5 ohm, E equaling 130 volts, or when $\frac{130 \times 130}{1 \times 1} \times 0{\cdot}5 \times \frac{44{\cdot}3}{33{,}000} = 11$ horse power can be utilized outside of the machine, while as many are lost in the machine. Again if $R = 9r$, as in the case mentioned for illustration in the SCIENTIFIC AMERICAN, that is, R = 4·5 ohms, $\frac{130 \times 130}{5 \times 5} \times 4{\cdot}5 \times \frac{44{\cdot}3}{33{,}000} = 4$ horse power can be utilized outside of the machine. In the first case, as compared to the second, 25 times as much power is lost in order that 2¾ times as much useful effect may be obtained.

Seeing that Mr. Weston has failed to understand this statement, though expressed clearly in the article he criticises, his talk about your denying the truth of Ohm's law is highly ridiculous, as well as his boastings about exposing your so-called absurd theory. His placing a few letters and equations in his letter makes more absurd the total lack of power he has to apply them.

FRANCIS R. UPTON.

The Ice Cave of Teneriffe.

To the Editor of the Scientific American:

Having read in your valuable journal several articles or communications on the subject of "ice caves," and this island having one, which perhaps is the only one of its conditions and circumstances on the globe, I propose to give you some account of it. In giving the facts I do not pretend to explain them, but, on the contrary, would be pleased if some of your scientific contributors would give a satisfactory explanation of the phenomena which I will proceed to describe.

The ice cave is situated on the "Peak of Teneriffe," over 10,000 feet above the level of the sea, and nearly 2,000 feet from the summit. The point that most calls my attention is, not that it exists there (as it is quite cold there even in summer), but the fact that the mountain is an extinct volcano, and by many supposed to be only slumbering now. Nor is this the only point that merits remark, for there is the added fact that the water in the cave is not congealed on the surface, but on the bottom.

The cave supplies the ice consumed in these islands, from which it may be inferred that the quantity is not insignificant.

The mouth of the cave is an opening or well hole, in what seems to be an immense pile of bowlders; the mouth is irregular in shape, and about two yards square. The entrance is made by being lowered perpendicularly some 15 feet to terra firma, where one finds himself on a small plat of earth and stone, say five yards square, and almost surrounded by what seems a small pond of clear water. After the eyes are a little accustomed to the dim light the visitor can see the walls of the cave, which are of earth and stone. The cave is about 100 feet long by 30 feet wide, with roof 10 to 15 feet in height.

The water is from 1 to 2 feet deep over the ice, which has to be dug out with pickaxes. The ice is not like that in our American waters, being granulated and coming out in irregular shaped lumps, from the size of an egg to that of a man's head. When extracted it is found more or less dirty from the earth and pebbles mixed with it. It serves, however, for medicinal purposes, and for making ice creams, etc. In several places the water drops slowly from the roof, but the chief supply seems to trickle through small crevices in the walls.

Some distance higher up the mountain, and some 400 yards away from the cave, there are seen a number of jets of what seems smoke or steam issuing from small crevices in the rocks, and on applying the hand the heat is found to be insupportable for even a moment.

I give these facts from a personal experience, and can vouch for their veracity. They appear to me to be of such a peculiar nature when considered together that they should merit the attention of scientific minds. H. B. M.

Santa Cruz de Teneriffe, Canary Islands, October, 1879.

A Puzzle for Future Geologists.

A singular discovery was made during last year's dredging operations of the Coast Survey Steamer Blake, in the Caribbean Sea; a discovery which should furnish a lesson of caution to geological observers and theorizers.

While dredging to the leeward of the Caribbean Islands large accumulations of vegetable matter and of land *débris* were brought up from deep water, many miles from shore. It was not an uncommon thing to find, at a depth of over 1,000 fathoms, and some 10 or 15 miles from land, masses of leaves, pieces of bamboo and of sugar cane, dead land shells, and other land *débris*, which were undoubtedly all blown out to sea by the prevailing easterly trade winds, and frequently masses of vegetation, more or less waterlogged and ready to sink, were found floating on the surface of the sea. The contents of some of the trawls would, indeed, have sorely puzzled a palæontologist if he had met them in a fossil state; amid deep water forms of fishes, crabs, echinoderms, sponges, etc., would be found orange and mango leaves mingled with branches of bamboo and nutmegs, so that it would have been difficult to decide whether the marine or the land fauna predominated. Such a find in a fossil deposit would probably be explained as having occurred in a shallow estuary surrounded by forests. It is not without interest to observe that this large amount of vegetable matter thus carried out to sea seems to have increased in certain localities the number of marine forms of life.

Carpeting the Mississippi at New Orleans.

In a recent issue the New Orleans *Times* states that nearly all the first appropriation for laying cane mats along the river front, in the second and third districts of Orleans Parish, has been expended in the work.

Another appropriation of $60,000 was made in April last, and the department had advertised for bids upon the work, returnable on the 20th of October. The laying of the mats is done in a more satisfactory manner than ever before, as the men have greatly improved in skill by experience. The regular rate of speed now is two mats per diem, each mat having a length of two hundred feet and a breadth of twenty-six feet.

The mats are laid so as to lap over upon one another about six feet on each side, and are weighted down to the bottom of the river by long canvas bags filled with sand. In September the workmen were engaged below Elysian Fields street. The work in the upper district will be begun when the lower work is finished. The latter is by far the most important, and, owing to the presence of projecting wharves and of shipping, most costly and most difficult.

Completion of Cologne Cathedral.

The first stone of the Cologne Cathedral was laid August 15, 1248, and it is thought it will be completed in another year. The two towers have now reached their last stage, and have only to be fitted with their massive caps of solid stone work. For this purpose two great scaffoldings have to be erected at a dizzy height; one of them, however, already approaches completion. When the caps have been finished then a still higher story will have to be added to the scaffolding, in order to fix on the tops of the caps the gigantic foliated crosses, almost thirty feet high, which are to crown the towers. This operation will, it is expected, be performed next spring.

ACCORDING to Gerard von Schmitt, physician and traveler, the plant *Mikania guaco* possesses medicinal properties very efficacious in the treatment of cancer and allied diseases.