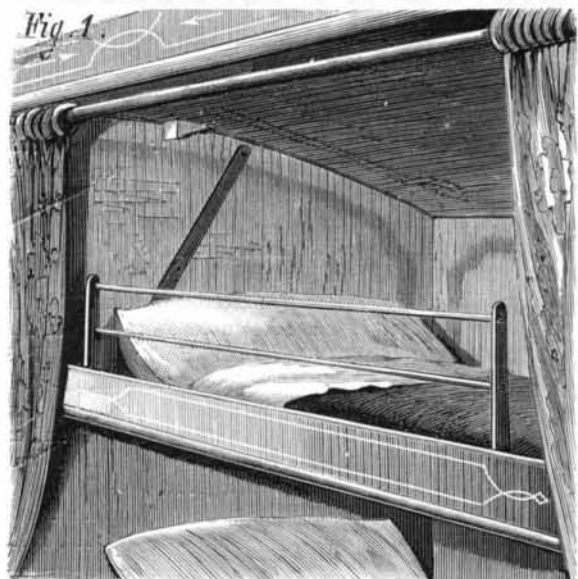


IMPROVED SLEEPING-CAR BERTH.

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.

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,

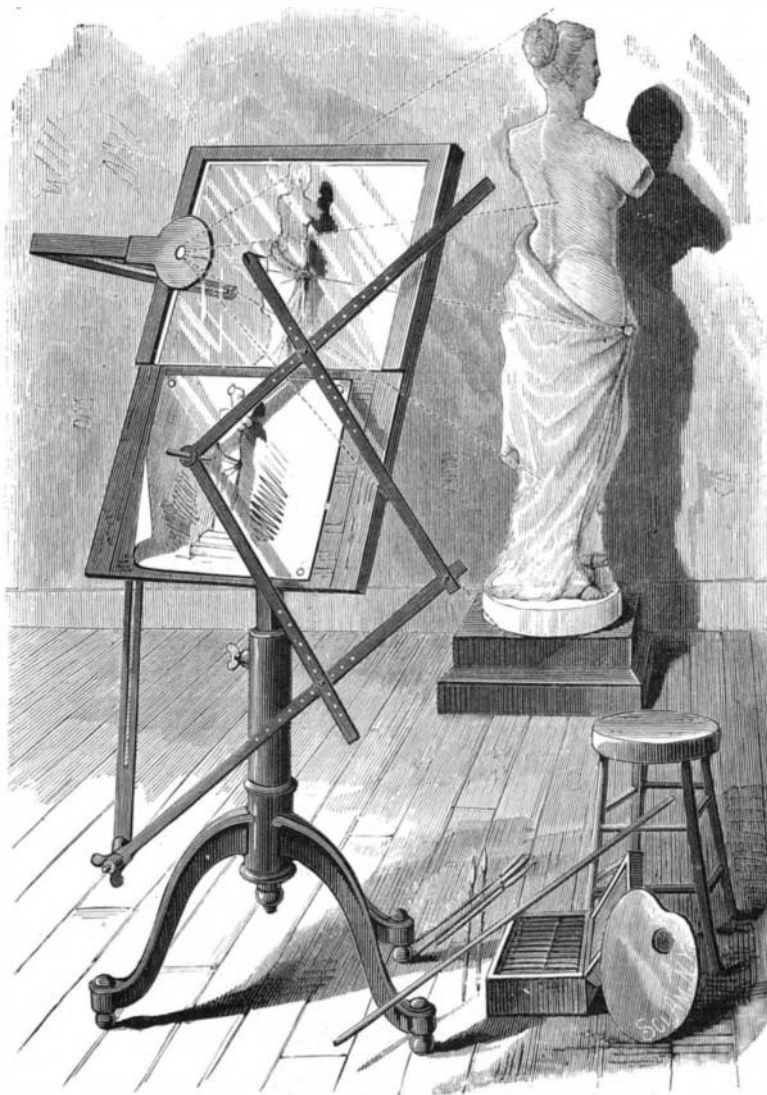
to which the apparatus was attached, having been filled with cold water, and the fan having been set in motion and the fire lit, the following was the result: The steam gauge started to move in three quarters of a minute; in one minute two pounds of steam were generated; in one and a half, eighteen pounds; 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 $1\frac{3}{8}$ 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.

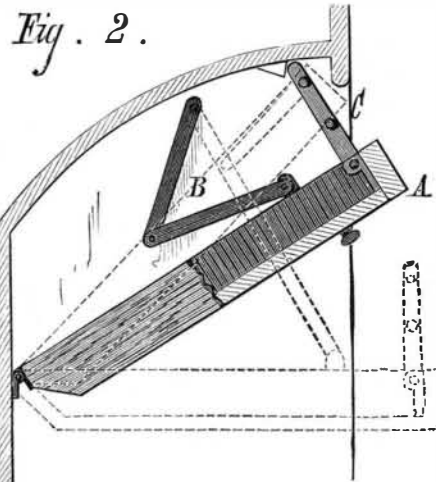


ROSQUIST'S PERSPECTIVE DRAWING APPARATUS.

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 cart-load.

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 the latter.