ing made in all more than 80,000. They are now engaged in the preparation of tools for the manufacture of the "Peabody Breech-loading Fire-arms." These arms will be made for infantry and cavalry use, and for sporting purposes. Probably no gun has ever been produced which has received so universal commendation. It was the gun selected out of sixty-five presented to a board of officers, appointed a few months since by the Secretary of War, to examine all recent inventions of small arms. It has received high approval in several countries, and is now before a number of foreign governments. This Company are also now engaged extensively in the manufacture of cotton machinery, especially ring spinning and speeders. They are about erecting a foundery, and will convert a considerable portion of their armory into a machine shop for the above purpose. At the Company's works, in North Providence, the manufacture of cast steel has been inaugurated with very satisfactory results. Nail and rivet hammers, beside many other articles, are being made by them from their own steel, and the manufacture of axes and hatchets will soon be added. The manufacture of cast steel is entirely new in our State—in fact it is a business which has not been known in our country until within a very few years. We have better ores and coal for this purpose in this country than there is found elsewhere, and yet for many years we have afforded the English manufacturers an immense market for their steel, and aided materially in enriching them.

American Velvet.

The machinery for the manufacture of velvet, in use by the American Velvet Company, was introduced into this country by them, under the superintendence of the inventor himself, Mr. Holt of Cheshire, England, who has entire charge of their establishment. It has been patented in England, France, and the United States. The superiority, in the matter of rapidity, of the manufacture by this machinery over the old method is as great as that of the modern railroads for purposes of locomotion over the old stage-coach system, or of the sewing machine of to-day over the ordinary mode of needle work. The old method is as follows:—grooved brass rods or wires were placed under the web which forms the pile, secured by threads woven in the warp. The weaver cuts the threads by means of a knife, held in the hand, the blade of which slides along the groove, dividing the pile into two rows of threads, thus giving a nap or pile of the depth of the rod inserted. The manufacture according to the patented method is accomplished by weaving two warps or foundations, with a middle warp alternately rising into the upper and lower, being secured by two shuttles moving at once. The knife moves horizontally, in the same direction as the shuttles, and the two warps and the pile between are divided, and the naps are cut into equal lengths. Two piled fabrics, the exact counterparts of each other, are thus made at one time. The shuttles and knives are all impelled by the ordinary motions of the power loom. The statement that 110 picks or threads are made in a minute (or nearly two every second) will give some idea of the rapidity of the manufacture. A man with the patented machine can make from 50 to 60 yards per week, while 8 or 10 yards would be a good week's work for the same person should he make use of the ordinary hand loom. The saving of labor by this process over the wire-weaving method is estimated at from fifty to seventy per cent, while the fabrics are equal, and in some respects superior to those of foreign make.

These looms were invented and imported for the especial purpose of manufacturing plush for gentlemen's silk hats, and in this article the Company claim that their workmanship cannot be equalled. American hat manufacturers, with but few exceptions, have abandoned the practice of sending their orders abroad for this material, and purchase their plush from the American Company. The looms are, however, adapted to the manufacture of all kinds of piled fabrics, since an article of this nature for gentlemen's caps has become very popular as a substitute for fur. Tartan or clan velvets are also made.—*Newark Sentinel.*

No less than 800 tuns of lead were obtained in one year from the dust accumulated in the long flues of a melting establishment in the north of England.

PLANS FOR COOLING AND VENTILATING BUILDINGS, BY MORIN AND REGNAULT.

The last number of *Le Genie Industriel* contains a report of plans recently presented to *l'Academie des Sciences* by two of the most eminent masters of science in France, General Morin and M. Regnault.

General Morin presented a memoir in which, after discussing at length the great injury to comfort and health that results from confined and heated air in workshops, dwellings, railway stations, and other buildings, he described the four methods of cooling that have been tried at the *Conservatoire des arts et metiers.*

By the first plan, the air, as it entered the building, was made to pass through a shower of water falling in spray. This required a large quantity of water, and it cooled the air only a little more than two degrees.

The second system consisted in passing the air through a vessel similar to a surface condenser—the air coming in contact with one side of a metallic sheet, the other side of which was exposed to a current of cold water. This system was effectual, but it required a very large surface, and it was necessary to cool the water with ice—one kilogramme of ice being consumed for every cubic meter of air cooled.

The third plan was simply to make openings in the building, so numerous and so arranged as to secure a rapid circulation of air. The discharge chimneys should be of sheet iron, rising ten feet above the roof, and should be of sufficient capacity to discharge all the air in the room at least twice an hour, with a current of 16 to 20 inches per second. The passages for the supply of air should open on the shaded side of the building, they should be as numerous as possible, and of sufficient capacity to keep up the supply with a current of 12 to 16 inches per second. The windows on the southerly side of the building should be shaded.

The reading of the memoir called up M. Regnault, who stated that in 1854 he was called upon by *M. le Ministre d'Etat* to propose a project for ventilating the buildings then in process of construction for the great international exhibition of 1855. In his project he rejected the processes founded on the cooling of the air by artificial means, and those in which ventilation is produced by machines; these means have always appeared to him inefficacious, embarrassing, and much too costly; he has always thought that the heat produced by the sun's rays gives a motive force more than sufficient to produce all the ventilation that can be desired in the summer season.

M. Regnault then described at length his plan for ventilating the great building. It was simply to make the roof—whether of zinc or of glass—double, with a space between eight inches in depth. The air was discharged from this space through numerous rectangular sheet-iron chimneys, exposing their broadest side to the action of the sun. The cool air was brought in from the north side of the building through subterranean channels of brickwork, and discharged through large hollow pillars of cast iron, which also served as supports for ornamental works of art.

Velocity of Light.

The observations of the eclipses of Jupiter's first satellite, and those of the phenomena of aberration, lead directly, although with a different degree of approximation, to the determination of the time light occupies to run over the mean distance of the sun from the earth. To deduce from this the absolute value of the velocity of light referred to our ordinary units of length, we must know how many miles are contained in the distance from the sun to the earth. The value of this distance is found by means of the parallax of the sun; we designate thus the angle under which, being at the sun's center, we would see the radius of the earth. The sun's parallax, calculated from the observations of the last transit of Venus over the disk of the sun is fixed at 8·57 seconds; hence the distance of the sun from the earth is equal to 24,109 times the radius of the earth, or to 95,384,900 miles. As this length is run over by the light in 8 minutes 18 seconds, or in 498 seconds, we conclude that the velocity of light is 191,391 miles in one second.

However, for some years, several circumstances have conspired to make us believe that the determination of 8·57 seconds given as the value of the sun's parallax is too small, and that the parallax ought to be augmented by a quantity not less than the thirtieth of its value, which would elevate it to about 8·9 seconds. From this increase in parallax results a diminution in the earth's distance from the sun, and consequently in the distance gone over in 8 minutes 18 seconds by the light; the velocity of light will therefore be reduced to a little less than 186,420 miles in a second. The next transit of Venus, which will happen in 1874, cannot fail to set at rest all doubts which may yet remain on this point.—*Delaunay.*

Safety Switches.

The numerous accidents that have lately been caused by running trains off the track at misplaced switches, has caused more than ordinary remark and sharp criticism by the general newspaper press. These strictures are every way deserved. There is no excuse for this class of accidents, none whatever, and when they take place, no matter whether the switchman is either stupid or drunk or not, the company or the manager is at fault. There is a simple guard against all these disasters, easily applied and open to every railway company in the land; and it is comparatively inexpensive too. We refer to what is commonly known to railway men as the Tyler switch. Some fourteen or fifteen years since, we wrote several notices of this invention, recommending it in the strongest terms to the attention of railway men. Some few companies adopted it; but, as its use cost something for the patentee's fee, it did not go into general use, and has not to this day, in spite of all its really practical merits as a matter of safety and economy. Had this switch been generally adopted then, its use would have saved railway companies more than fifty times the amount of the patent fee, and the cost of the switches thrown in. The patent has now expired, we understand, and the inventor we fear has been but very illy paid for his labor and thought in perfecting this truly useful design; and now railway companies can use this invention without feeling that they have got to pay a few extra dollars for the discovery. The design of the Tyler switch is to prevent the train from running off when the switch is set to the wrong track by design or accident. The single rail or gate switch is established as the best switch for the ordinary purpose of shifting cars from one track to the other, but is liable to the serious evil of leaving one track open or broken when connected with the other. This improvement removes this evil, and while it accomplishes this important office, leaves the switch in its original simplicity and perfection of a plain unbroken rail, connecting one track with the other in its legitimate use. An important feature in this safety switch, which distinguishes it from all others designed for the same purpose, and which constitutes its chief virtue, is, that the safeguard or portion intended to to protect the switch, is always in position, and requires no action of the train to place it right when it comes upon the open track, thereby avoiding all reliance upon the movements of complicated machinery which may be displaced by ice, gravel, flaws in the material of which it is made, or any of the known obstructions to such apparatus. Cases have occurred where trains have passed over this switch when set wrong by mistake, at a speed of forty miles to the hour and still kept the track. During the past week, we have seen an engine run over this switch, purposely set wrong, without experiencing the slightest trouble. It is enough to say of its practical merit that it has been generally adopted throughout New England, the exceptions being very limited, and that it meets the entire approbation of our most intelligent Superintendents and Master Mechanics. It is the safeguard that it pretends to be; and hereafter, when disasters happen by trains running off at switches, it will be the duty of juries, when estimating damages, to ask whether the companies have availed themselves of this switch. If they have not, then the company should be assessed for its neglect.—*Railway Times.*

Dr. Ure says, "All the artificial alloys of silver, with steel, of which so much has been said, are not fit for anything, and are never met with in commerce."