GRINDSTONES.

What can disable a machine-shop more effectually than to destroy the *grindstone?* Unless the loss were supplied by the modern substitute, the emery grinder, to destroy the grindstone would be to wreck the shop. A thorough study of the subject will develop more requirements than many think, and much ingenuity or skill in designing might be displayed in working out the problem. It should be strong, simple and clean; the trough expanded to catch as much as possible of the drip water and grit; a movable shield securely hinged to keep the water from splashing, and yet permit the stone to be used from either side; rests provided upon which to rest tools and the rod for turning the stone, these rests being arranged to move toward the center as the stone wears smaller. The bearings should be generous in size, proper provisions being made for oiling without washing the grit into the bearings with the oil, and the ends of the bearings being protected by some device which effectually prevents the entrance of the grit. The stone should be secured to the shaft by nuts and washers, and the washers fixed so that they can not turn with the nuts as they are screwed up or unscrewed. In hanging the stone, great care should be taken to hang it true sidewise, not only for convenience in using, but because a stone that is not true sidewise can never be kept true edgewise.

Suppose a stone to run one-fourth of an inch out of true sidewise, and while in motion draw a line around it within three-eighths of an inch from the edge, on an average. From this line there would be but one-fourth of an inch of stone on one side and one-half on the other. If you had a stone only this in thickness—that is, a stone one-fourth of an inch thick on one side and one-half of an inch thick on the other—would not the one-fourth-inch side wear away faster than the other? That is exactly what it does on that side of the thick stone, only the thicker the stone and the less it is out of truth the less it wears.

LUBRICANTS.—The evils attending the use of oils and fats as lubricants upon machinery are well known to engineers and mechanics, but the causes and nature of their injurious action are not so generally understood. We give, therefore, a brief but very lucid explanation of their action which we find credited to Dr. Marquardt, by our contemporary, the Boston *Journal o Chemistry*. The most obvious and least objectionable evil attending their use is the gradual oxidation (or gumming) which they undergo, and in consequence of which their lubricating qualities rapidly diminish. A more objectionable property of these substances shows itself when they are applied to such parts of machinery as are more or less highly heated. In such circumstances, these substances are decomposed into their constituents, glycerine and fatty acids. The latter combine with the iron work of machinery to form an iron soap, the metal surfaces being corroded thereby and fresh surfaces exposed to corrosion. Marquardt recommends the substitution of the mineral oils (heavy petroleum products that boil above 600° F.) for animal oils and fats as the remedy.

THE IMPORTANCE OF SANITARY ENGINEERING. Prof. Trowbridge, of the School of Mines, in a recent lecture before the Engineering Society, advised young engineers to give their attention to sanitary engineering, and reminded them that a problem worthy of the closest observation was the excessive cost of railroad transportation. The problem that now pressed upon them, said he, was of a social nature—how to prevent disease, and how to elevate the poorer classes. No doubt there would be a future in which the engineer, the capitalist and the statesman would unite for the promotion of human welfare.

THE St. Gothard tunnel will be completed by the end of November.

THE NEW EDDYSTONE LIGHTHOUSE.—The tower of the famous Eddystone lighthouse is now in a fair state of efficiency, but the gneiss rock on which it stands has been seriously shaken by the incessant sea strokes on the tower, and the rock is considerably undermined at its base. It has, therefore, been determined to erect a new tower on a spot which affords a good foundation near low water level, at about 127 feet distant from the present site. The focal plane of the present lighthouse is at an elevation of 72 feet above high water; that of the new building will be 130 feet. The actual useful range of the light, which is now about 14 nautical miles, will thus be extended to 17½ miles. The new tower will be constructed entirely of granite. The hight will be 138 feet above the rock to the top of the cornice, and the diameter of the tower under the cornice will be 18 feet 6 inches. The tower will be solid (with the exception of containing a water tank) to the hight of 25 feet 6 inches above high water springs. At this level will commence the side walls with a thickness of 8 feet 6 inches, diminishing to 2 feet 3 inches at the top. The tower will contain nine apartments, each 10 feet in hight, in addition to the lantern, the seven uppermost being 14 feet in diameter. The estimated cost is £78,000.

THE SPEED OF SCREW STEAMERS.—It is generally supposed that the builders of steam vessels have so mastered the principles of their art that they can predict to a nicety what speed a given vessel will have when driven by an engine of a certain horse-power. A recent instance in England shows that this is far from being true. A twin screw vessel in the British navy, the *Iris*, was built for great speed. Mr. Froude, who is considered the best authority in the world, predicted that it could be driven at 17.5 knots per hour with 7,000-horse-power. His calculations were checked by the admiralty and found correct. At the trial her engines indicated 7,503-horse-power, but the speed was only 16.577 knots. The screws were then changed, and the speed attained was 18.573 knots, or more than a knot faster than was expected. Here were two distinct errors. The *Engineer* concludes from these trials that very little is known accurately concerning the action of screw propellers, even by such men as Mr. Froude and Mr. Barnaby, chief naval constructor of the admiralty.

ENORMOUS ENGINEERING UNDERTAKING IN FRANCE.—The new French Minister of Public Works, M. de Freycinet, proposes a series of engineering works which effectually puts into the shade anything ever attempted on this continent. Even the Isthmus canal pales before this new project. So far as the amount of capital is involved, M. de Freycinet proposes to expend about $800,000,000 on a vast network of State railways and hydraulic works. His plans, which have almost all been sanctioned, comprise the maintenance of about 23,500 miles of national railways, not much more than half of which are at present in working order, and 5,000 miles of which have yet to be built, and the expenditure of $150,000,000 on new canals and old systems, and about $50,000,000 on the improvement and deepening of ports and harbors.

RENDERING ARCHES AND TUNNELS WATERPROOF.—A composition formed by the admixture of about equal parts of coal-tar pitch, Archangel pitch, Stockholm tar, cotton seed oil, anthracine oil, and resin is proposed by Mr. Hamor Lockword, of Manchester, for rendering arches, tunnels, etc., impervious to water. The composition being well mixed and heated, a coating of the same about one-half inch thick is first laid on the top of the arch or bridge, and then a light coating of varnish applied hot, followed by a layer of brattice cloth, then another coat of varnish, and next a layer of roofing felt, and a third coat of varnish, after which he applies a second coat of brattice cloth, and finishes off with a one-half inch coating of the first-named mixture or composition.

COLD WAVES AND THEIR CAUSES.

The climate of the United States, especially the eastern portions of it, is subject to great and rapid changes. These are caused, in many instances, by the large extent of surface over which its territory extends, and the difference in the amount of solar heat received in different parts. When large bodies of snow have been deposited in the north, the wind sweeping over them is deprived of its heat, and a lower temperature is the result. When winds from more southerly latitudes occur, the reverse takes place. The vicinity of the large oceans which margin the continent of North America on the east and west also tend to produce a change, water parting with its heat less readily than the land. In addition to these the current of warm water thrown along the east coast of the United States by the Gulf stream, and in the Pacific by the Sea of Japan, also exerts a powerful influence on the climate of the regions adjacent to the shores touched by them. In the great valley of the Mississippi the cold wave usually has its origin in the ice and snow-covered countries directly north, and periods of drouth by winds from the south.

In European countries the cultivation of the soil and the removal of timber have produced important climatic changes, and the same has been noticed in the United States. Our winters have not so much severe weather as occurred in the early settlement of the continent, but it takes place more suddenly and to a greater extent. This is easily accounted for, as the surface of the country, when denuded of timber, presents less obstruction to the advance of storms, and also affords a greater diversity of exposure in its surface to the rays of the sun, and becomes more readily and differently heated. As is well known, wind is nothing more than air rushing in to restore the equilibrium which has been disturbed by expansion caused by heat, and when the air thus moving is loaded with snow or other vapor, this, when meeting with air of a different temperature, condensation takes place and rain or snow is deposited.

The influence of these sudden changes on health is a subject for the investigation of medical men and philanthropists. That it has much to do in causing physical infirmities can not admit of a doubt. A change of 40 degrees of temperature, such as occurred on January 2d, must aggravate all diseases of the pulmonary organs, and hence, perhaps, the extent and fatal effects of consumption in the Eastern and many of the Western States.

Countries in which the temperature is nearest uniform, whether it be high or low, are generally least afflicted by diseases which arise from exposure to the extremes of heat and cold; while almost every portion of the habitable globe is subject to visitations from maladies which produce disease and death. These generally arise from local causes, such as stagnant water and large quantities of animal and vegetable matter undergoing decomposition. They do not extend to large areas, and instances of longevity in such countries are not uncommon. The lengthening day and the restoration to a state of rest of the disturbed atmosphere will cause the cold waves to be in a manner temporary; but so long as large bodies of ice and snow are spread over the Great Lakes and large portions of the North and West, the recurrence of these waves of cold may be expected to prevail.—*The Meteorologist.*

TO RESTORE THE LUSTER OF JEWELRY.—Take one ounce cyanide potassium and dissolve in three gills of water. Attach the articles to be cleansed to a wire hook, immerse and shake in in the solution for a second or two, and remove and wash in clean water, then in warm water and soap. Rinse again, dip in spirits of wine, and dry in boxwood sawdust. If the solution is kept, put it in a tightly corked bottle, and label poison conspicuously. One caution is necessary: Do not bend over the solution so as to inhale the odor, nor dip the fingers in it; if one of the articles drops from the hook, better empty the solution in another vessel.