

To remove rust from bright steel surfaces make a mixture of 10 parts tin putty, 8 parts prepared buck's horn, and 25 of alcohol. Apply this on a piece of blotting paper.

A COMPOSITION for welding steel may be made of one part sal ammoniac and ten parts borax. These should be poured together, fused to clearness, cooled and reduced to powder.

THE hardness of steel tools may be much increased by making them white hot, dipping them repeatedly into sealing wax until cold, and finally touching them with oil of turpentine.

A GLASS factory at Liverpool has glass journal boxes for all its machinery, a glass floor, glass shingles on the roof and a smokestack 105 feet high, built wholly of glass bricks, each a foot square.

THE lineal expansion that takes place in iron exposed to heat amounts to .00008 inches for each foot raised 1 degree F. The expansive strain produced by about 12 degrees of heat is equal to that produced by a tension of about one ton per square inch of section.

THE collapse of one of the sky-scraping Chicago public buildings from a violent storm is not a surprise. The Western idea of enterprise, observes the *Manufacturers' Gazette*, is to make the largest show possible with the least capital. It is not a good idea in any line, but is especially objectionable for buildings whose downfall destroys human lives.

FIVE years ago there were 50 miles of electric street railways in the United States. To-day, out of 11,655 total miles of street railways, over 6,000 miles are operated by electricity. It is stated that the capital now invested in electric appliances of all kinds in the United States is \$80,000,000. By-the-way, the low price of horses for export from Canada is not so much due to the McKinley Bill as to the development of electric railways, through which change thousands of horses are being turned off every month.

DAVID URCH, of Portsmouth, is the inventor of what he calls the "pendulum propeller." It is intended to be affixed to the side of any vessel having on board a steam engine of any description, to give power in calm or light winds, or when entering or leaving port. A trial of the contrivance was made in Portsmouth harbor recently on the fishing schooner *Comet*, an engine of five-horse power being placed on her deck. The vessel steamed up and down the river, making three knots an hour. The machine is fastened to the vessel's side, well up to the plank-shear, with three bolts, and when not in use the screw can be swung to the level of the rail, or higher, by a small chain fastened to the lower portion of the "pendulum."

As the English people will not allow a tunnel under the English channel, a bridge across it is proposed. The depth of the channel is not great, and British and Continental engineers are now busying themselves in making plans for a bridge of steel to unite England and France. The structure is to be 200 feet high, wide enough for two railway tracks, and will cost, if built, at least \$163,750,000, or nearly twice as much as the proposed Nicaragua Canal. Speaking of this reminds us of another big scheme which will dwarf the seven wonders of the world—the building of a railway bridge across Behring Straits to join America and Asia. One engineer says it is quite feasible, as the Straits are shallow, and the islands numerous enough to make the scheme practicable.

THE use of cast iron in columns of buildings ought to be prohibited by law. It is treacherous and liable to sudden fracture from internal stresses developed in cooling. It possesses no ductility, and besides this, when on the point of rupture, shows no sign of distortion whatever. Wrought iron and steel are better in every way. It is known that blast furnace metal is often run into column moulds directly, while on the other hand, the very processes by which the former materials are made ensure a higher and more uniform quality of metal. Moreover, should either of these accidentally be called on to bear a strain beyond its proper strength, ample warning is given by its becoming distorted long before it gives way. Castings have been known to explode from the effects of internal cooling stresses before being subjected to any strain at all. The employment of cast iron may be permissible in large masses and in proper places, but it certainly ought not to be used as it is at present, in columns abutting one above the other, from the bottom to the top of high buildings.

THE method of hauling coal in the tunnels of coal mines by means of trucks drawn by horses or mules will soon be superseded by electric coal mining locomotives. The new method has already been successfully tried by the New Vancouver Coal and Land Co., of Nanaimo, B. C., who have just had the fourth electric locomotive turned out from the shops of the Canadian General Electric Co. at Peterboro. This style of engine develops a speed of 8 miles an hour on the average curves and grades of mines, and will haul a train of trucks loaded with 40 tons of coal. The requisites of such a locomotive are that it should be powerful, easily handled, compact, rigidly built, and develop its energy under the most adverse conditions. It must not stand higher than 5 feet from the rails, nor be wider than 3½ feet. The machine, says the *Peterboro Review*, in an interesting description of the engine just turned out, is a marvel of compact and powerful building. From his seat in front, the engineer or motor man can control the movement of the train, start, stop, reverse or hold with the powerful brake the entire train on a steep grade. The frame is two immense castings resting on four wheels coupled by connecting rods. The power is transmitted from the armature to the rear driving wheels by gears. Electric lamps at the front and rear brighten the way for the man at the wheel. To avoid the possibility of the locomotive being disabled, the entire mechanism for control has been made unusually heavy, the whole being covered by an iron roof of heavy plate, and the front suitably protected.

THE terrible disaster at Pontypridd, South Wales, again calls attention to the danger arising from the use of wooden frame works in mines. In this case there was no explosion of gas at all; but the underground woodwork seems to have caught fire through some accident, and then, owing to the dryness of the material, the conflagration spread rapidly, cutting off the men in distant workings from all chance of escape. The result was that over sixty miners lost their lives. Mr. Alrahnd, speaking at a meeting close to the scene of the calamity, advocates the use of stone or iron instead of wood, and advises that all the "headings" should be covered with something of the same nature. Of course the hindrance to such an alteration would be the great increase of expense; but we are not sure that in the long run owners of collieries would not find this initial expense more than repaid by the lessened risks of serious fires.