The Effects of Intense Cold upon the Mind.

Extreme cold, as is well known, exerts a benumbing influence upon the mental faculties. Almost every one who has been exposed, for a longer or shorter period, to a very low temperature has noted a diminution in will power, and often a temporary weakening of the memory. Perhaps the largest scale upon which this action has ever been studied was during the retreat of the French from Moscow. The troops suffered extremely from hunger, fatigue, and cold—from the latter perhaps most of all. A German physician who accompanied a detachment of his countrymen has left an interesting account of their trials during this retreat. From an abstract of this paper by Dr. Rose, in the New Yorker Medicinische Monatschrift, we find that of the earliest symptoms referable to the cold was a loss of memory. This was noted in the strong as well as those who were already suffering from the effects of the hardships to which they had been exposed. With the first appearance of a moderately low temperature (about five degrees above zero Fahrenheit), many of the soldiers were found to have forgotten the names of the most ordinary things about them, as well as those of the articles of food, for the want of which they were perishing. Many forgot their own names and those of their comrades. Others showed more pronounced symptoms of mental disturbance, and not a few became incurably insane, the type of their insanity resembling very closely senile dementia. The cold was probably not alone responsible for these effects, for a zero temperature is rather stimulating than paralyzing in its action upon the well-fed and the healthy. These men were half starved, poorly clad, worn out with long marching, many already weakened by dysentery and other diseases, and all mentally depressed, as an army in defeat always is. It needed, therefore, no very unusual degree of cold to produce the psychic effects observed under other circumstances only as a consequence of exposure to an extreme low temperature.—Medical Record.

Will Coal Dust Explode?

That the dust of certain coals is explosive has been asserted time and time again in these columns, and evidence in support of the assertion has been abundant. We now have fresh evidence in a series of experiments conducted by Mr. W. Galloway, formerly one of the British mine inspectors, at Merthyr, on December 1. Mr. Galloway fitted up special apparatus with internal fans for the purpose of mixing the dust with the air. No gas was used, as the object of the experiments was to determine whether coal dust alone was explosive.

Before commencing his experiments, Mr. Galloway delivered an address to a number of gentlemen interested in the matter. In the course of his address he said that the reason the coal dust theory had not been more generally accepted as the cause of great explosions in deep, dry mines was because the public had not had opportunities of seeing dust in actual explosion. He had therefore determined to make these public experiments so as to convince skeptics that the theory was correct. He explained that when explosions occurred in dry mines the flame traveled through the intake airways and not through the returns or the faces, the reason being that the intakes, being the main haulage roads, were naturally very dusty, and this dust was deposited on the ledges and timbers, ready, when a disturbance occurred, to be mixed with air and become explosive. He further stated that whenever, after an explosion, smoke or dust issued from a mine, and wherever charred coke was visible on the timbers, it was safe to say that a coal dust explosion had occurred, or that coal dust had been the principal cause of the explosion, for a fire damp explosion produced no smoke and left no charred coke on the timbers.

The reason why, after some explosions, charred coke was found in some parts of the mine and not in others was explained by the fact that in these parts where coke was discernible the dust had been pure coal dust, whereas in other parts of the mine the coal dust on the roadways was largely mixed with stone dust, and although there was sufficient coal dust to be inflammable and to carry on the explosion, the admixture of stone dust prevented the formation of coke. In order that coal dust might combine rapidly with air and form an explosive mixture it had necessarily to be very fine. It would not ignite immediately if taken from the roads, there were too many coarse particles in it, but the coarse particles would rapidly fall to the ground and the mixture in the air become explosive.

The following is a list of Mr. Galloway's experiments, with the reported results:

1. A cannon shot, with 1 oz. of gunpowder, stemmed with great care, but not too tightly, placed on a ledge 9 in. from the ground, fired into vacancy, produced a flame 3 ft. long.

2. A cannon shot, with 1 oz. of gunpowder, stemmed as before with 1 oz. of coarse coal dust, made a flame 7 ft. long, fired from the same place and position.

3. A cannon shot, 1 oz. of gunpowder, stemmed with 1 oz. of coal dust, mixed with ⅛ oz. of heather dust, made a flame 8 ft. long, but of greater volume.

4. A cannon shot fired into the tube, where 1 lb. of coal dust had been placed and stirred, caused a flame 12 ft. long.

5. A shot with 1 oz. of gunpowder, stemmed with 1 oz. of coal dust, fired into the tube, which contained 1 lb. of coarse coal dust, produced a flame 15 ft. long with a greater volume.

6. Shot, stemmed as before with powderand coal dust mixed with ⅛ oz. of heather dust, produced a flame 14 ft. long.

7. Similar shot fired into tube containing ½ lb. of finest coal dust produced a flame 14 ft. long.

8. Similar shot, 12 oz. finest coal dust, flame 14 ft., greater volume.

9. In this case no additional dust was placed in the apparatus, but some remained since last shot; 1½ oz. gunpowder used, flame 9 ft. long.

10. No additional dust, similar shot, 10 ft. flame.

11. Similar shot, tube entirely free of dust, 1 oz. of gunpowder, flame 5 ft. long.

12. Similar shot, no dust, tighter stemming, flame 5 ft., report considerably louder.

13. Shot with 1 oz. gunpowder, fired into a mixture of stirred-up coal dust, produced flame 14 ft. in length.

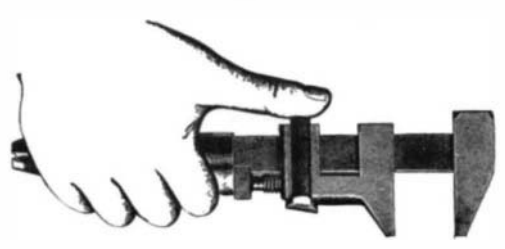
14. Similar shot, 12 oz. coal dust, flame 12½ ft. long.

15. Similar shot, 1½ lb. of coal dust, flame 16 ft. long.

16. Similar shot fired into tube extended to 18 ft. long, containing 2 lb. of coarse stirred-up coal dust, made a flame 23½ ft. in length.—Colliery Engineer.

A CONVENIENT WRENCH.

The bar of this wrench is of open hearth steel, drop forged and case hardened, and it is designed to be an especially well made and durable tool. It is manufactured by the Standard Tool Company, Athol, Mass. The sliding jaw and the working parts are of hardened steel, and it is styled the "rapid transit wrench" from the fact that, by a slight thumb pressure at the point indicated in the illustration, the screw is released from engagement with a nut, and the sliding jaw may be moved in either direction without turning the



screw. The screw lies flat on the bar, preventing its being accidentally bent or sprung, and a spring under the point on which the thumb is represented normally draws the nut to a true bearing on the screw and takes up all wear.

The Electro Nickeling of Metallic Surfaces.

The following baths (most of them well known) have all given good results, but require careful handling:

1. 8 kilos. nickel ammonium sulphate in 100 liters of water, made slightly alkaline with ammonia, and then weakly acidified with citric acid.

2. 5 parts nickel sulphate neutralized with ammonia, 3·75 ammonium tartrate, and 0·025 gallotannic acid per 100 of water. This gives a homogeneous white and smooth reguline deposit, even when of great thickness.

3. 2·75 nickel acetate, 2·5 calcium acetate, and 100 of water, afterward mixed with 0·7 part of acetic acid (sp. gr. = 1·047) and filtered. (Potts' formula.)

4. 5 nickel ammonium sulphate, 2 ammonium sulphate, 0·5 citric acid, and 100 of water. Boil and filter.

5. 8 nickel ammonium sulphate, 1 ammonium chloride in 100 of water, with or without the addition of 0·5 part barium oxalate.

6. 6 nickel ammonium sulphate, 3·5 ammonium chloride, and 2·5 ammonium sulphate per 100 of water.

7. 5 nickel ammonium sulphate, 1 ammonium sulphate, and 100 of water. Specially suitable for cast iron.

8. 5 nickel ammonium sulphate, 2·5 boric acid, 100 water.

Powell has found that the addition of not more than 1 to 8 grms. per liter of benzoic acid or of a benzoate to a suitable nickel bath produces a good and pure deposit. Baths containing boric acid, such as are commonly employed, give a good deposit upon smooth surfaces, but refuse to cover cavities or hollows; this difficulty may be removed by the addition of sodium chloride to the bath. Such a bath may be made by dissolving 5 kilos. nickel ammonium sulphate in 100 liters of water, adding 2·5 (or 1·25) kilos. of boric acid and 1·25 kilos. of sodium chloride, boiling, acidifying with citric acid, neutralizing with ammonia, and filtering.

So also nickel chloride with boric acid in the proportion of 5:2 or 2:1 gives a good bath, but it is not suitable for depositing upon iron or steel, as all baths containing chlorine are apt to cause rusting of these metals. The use of citric, benzoic, tartaric, or other weak acids is to be recommended for them, except upon the score of expense.—Ding. Poly. J.

The Oil Fields in Ohio.

A number of very valuable oil fields have been discovered in Ohio the past year. The income from these wells, based upon their present output, promises to make an appreciable addition to the oil interest of the country. One of the new wells, known as the Kirkbridge, produces 310 barrels of crude oil per hour, or 7,440 barrels per day of 24 hours. Another single well averages over 1 200 barrels per day. To do the work of collecting, refining and shipping this immense product, an elaborate system of pumping stations, tanks, piping and other forms of machinery have been provided.

It is not generally known that the oil interests of Ohio have developed very rapidly of late, and that Ohio, as an oil producing State, promises to rival Pennsylvania. In a single county, Wood, the pipes for carrying the oil consist of 340 miles of 2 inch pipes, 70 miles of 3 inch pipes, 125 miles of 4 inch pipes, together with other sizes, making a total of some 800 miles of pipe, and representing an outlay of $15,773,000. In addition to this the oil territory contains 260 storage tanks, which have cost $6,000 each, and there are besides immense outlays necessary for bonuses, rentals, labor and building. At present the storage tanks of Wood County contain about 8,000,000 barrels of crude oil, valued at $4,400,000. During the past year the output of oil from Wood County alone has been 20,000,000 barrels of oil. In other counties of Ohio the interests are also very large. There are at present some 17,500 oil wells in Ohio. Of this number over 3,000 have been drilled during the past year.

The Registration of Trade Marks in Germany.

Under the act which came into force in Germany on October 1 of 1894, the local registrations of trade marks are completely abolished, and they must, in future, be registered at the Patent Office in Berlin. There the authorities take every precaution against innocent or other duplications of trade marks, or infringements of the rights of those who already own such things. When an application is made, the officials search the register, and if a trade mark in any way approaches that which is proposed to be registered, the owner of the old trade mark is communicated with. He can then take steps to prevent the new trade mark being registered, or, if it be a flagrant infringement, the government may perform this office on their own account. Also, the old plea of "ignorance of registration" is now abolished, and, by the new act, the infringer of a trade mark is liable to penalties and damages for "carelessness." The carelessness in question may simply consist in the fact that he did not properly search the register and find that he was doing wrong in using a trade mark which either did not belong to him or was a colorable imitation of an older mark. Under the old law, an English or foreign owner of a trade mark had to warn a German pirate before he could take action, but now this is abolished, and, if only the original trade mark be registered in Berlin, the owner can claim damages for infringement without giving warning to anybody. At present, the marks in the register under the old act can be registered under the new, and old foreign trade marks can likewise be protected.

Powder Engines.

In the course of an interesting lecture on "Modern Explosives," recently delivered by Colonel Barker, Superintendent of the Royal Small Arms Factory, Sparkbrook, reference was made to the possibilities of the industrial use of high explosives for generating motive power. The construction of a gunpowder engine has often been attempted. But this explosive is ill adapted for such a purpose—in the first place, because it only develops in combustion about 280 volumes of permanent gases, while the solid residues are very considerable, and would soon clog any machine. At the same time, it should be remembered that one pound of gunpowder is capable of developing 170,280 foot pounds of energy. The new smokeless powders are capable of developing still higher energy, and are also more under control, while giving off nearly 1,000 volumes of permanet gases, and leaving no solid residue. The temperatures developed by all these propellants are high; but it is very possible to overcome this difficulty, in the same way as it is done in the case of gas engines, or even by making use of the energy of the water so employed when converted into steam. As English cordite develops 1,250 calories per gramme, the possibility of its employment in some form of "powder gas" engine is not without attractiveness to engineers of a speculative turn. The temperature of gunpowder on explosion is about 4,000° Fah., and that of the smokeless powders is believed to be considerably higher, though this has not yet been fully determined.