

fresh air at 90° or 95°, which seems to be most conducive to comfort. The men, under these circumstances, work with great vigor, but have to be frequently relieved.

"This great heat is said to be very productive of heart-disease. There is no doubt that this effect is intensified by excessive barometric pressure and by dampness of the air, preventing evaporation from the body. It is affirmed that the system in use at the Comstock is so thorough as to do away with most of the danger from all these sources.

"To spare the men a needless and wasteful expenditure of bodily force, it has been found best to use cages worked by engines, to raise and lower those who are going to and from work.

"The excessive quantity of coal-dust which chokes the air of badly-ventilated mines has been previously alluded to as affecting the lungs. But there are other causes of pulmonary trouble, quite obvious in their nature, such as sudden changes from heat to cold, and deliberately sitting down in draughts to cool off while working in the high temperatures mentioned. On the whole, the principal diseases are miners' asthma, consumption and rheumatism, and, among those who have worked long in badly-ventilated places, dyspepsia, tremors, vertigo, and other troubles arising from blood-poisoning.

"As regards accidents, they are due to a great many various causes; but more than one half of them in the Pennsylvania coal mines, are caused by falls of rock, coal, or slate. It is the opinion of good judges that a very large number of these casualties could be avoided by sufficient timbering of the roofs and sides. One and a quarter in every hundred, or 12½ men in every 1,000, employed in these mines, are killed or wounded every year by accidents, and it seems that here is a distinct and obvious field for a humane reform, either by legislation or private effort."

Apart from the self-restraint which the author has imposed on himself in the treatment of a theme of which he is full, there is throughout the work a remarkably moderate, conservative tone, combined with a disposition to accept what is good from any source, that impels us again to characterize this as a wise little book. The typographical appearance is remarkably neat, the paper excellent, and the Index is preceded by a short bibliography.

A NEW USE FOR STEEL SCALE.

Messrs. Henry Porter, of the Bowesfield Boiler Works, Stockton, and John Thomas, late of the Acklam Ironworks, Middlesbrough, have recently introduced into the market an invention which is worthy of notice on account of its utility. They have established works at Bowesfield for the manufacture of paint from steel scale, for the protection of steel and iron, in any position and in any climate. The paint is finding much favour, having been applied by such firms as Messrs. Bolckow, Vaughan, and Co., the Carlton Iron Company, Messrs. Pease and Co., the Tees Conservancy Commissioners, Messrs. Kirk Brothers, Workington; and others. The invention affords another illustration that nothing need be allowed to waste. Mill scale was certainly not altogether wasted before, but it can now be made much more valuable. Messrs. Porter and Thomas obtain from the steelworks in the locality the scale that falls from the steel as it is passing through the rolls, and this, by their special machinery, they grind until it becomes as free from grit as flour and it is mixed with boiled oil and colouring matter. Thus we have steel structures painted with steel. Two kinds of paint are manufactured, the first for use above water, to prevent the structures from rusting, and this is named the anti-corrosive paint; the second is for use under water, to prevent fouling, and is termed the anti-fouling paint. We may mention that a portion of Red-car pier is painted with the anti-fouling paint, and there it has given great satisfaction after several months' trial. The anti-corrosive paint answers admirably for iron bridges, railway rolling stock, coal, and iron plant, iron houses, &c., ships above water-line, boilers, engines, &c. Ordinary paints when applied to iron and steel structures soon begin to crack and scale off, and do not prevent the formation of rust, which is so destructive to the stability of metallic structures. The anti-fouling paint answers well for ships' bottoms, where it will prevent animal or vegetable life adhering, and the inventors say that if painted with two coats of the composition a vessel may go to India, China, or on other long voyages, and come home with a clean bottom. Barnacles, glasses, &c., cannot fasten on the bottom and live, for the ingredients of the paint destroy them. This is

of the utmost importance to ship owners, who have much trouble with the fouling of their vessels' bottoms. For blast furnaces the anti-corrosive paint will in the long run, it is said, be even more economical than gas tar; it will certainly more effectually prevent rust, and form an excellent protection to the metallic surface.

POPULATION OF CITIES IN 1880 AND 1870.

In the following we give the present population of the leading American cities, as compared with the census of 1870:

Cities.	1880.	1870.
New York.....	1,208,471	942,252
Philadelphia.....	843,000	674,022
Brooklyn.....	554,693	395,099
Chicago.....	502,940	298,977
St. Louis.....	395,000	310,864
Boston.....	352,345	250,526
Baltimore.....	350,000	267,364
San Francisco.....	280,000	219,473
Cincinnati.....	246,153	216,239
New Orleans.....	215,239	191,418
Washington.....	160,000	109,204
Cleveland.....	156,946	92,829
Newark.....	136,983	105,059
Milwaukee.....	130,000	71,440
Detroit.....	119,000	79,577
Louisville.....	112,000	100,753
Jersey City.....	105,000	81,744
Providence.....	104,500	68,904

HOT POLISHED SHAFTING.—Since the early part of 1876 the Akron Iron Co., of Ohio, have given much attention to the manufacture of hot polished shafting by a process which, while it yields a product possessing important advantages, is such that only the best raw material can be employed. This fact is in itself a guarantee against any inferiority in the shafting turned out, and has contributed to its growing popularity with the manufacturers of agricultural implement, in the construction of which light—and, therefore strong—parts are eminently a necessary factor. The process of the manufacture of hot polished shafting affords special facilities for turning out true work, and for making it to the gauge desired without having recourse to the lathe. A circumstance which makes the product of the improved process particularly suitable for lime and counter shafting is that it does not spring or warp in key seating. The well-known effect of polishing iron at an elevated temperature—that which gives Russia sheet iron its peculiar blue finish—is produced by the process adopted in this case. A magnetic oxide, adhering firmly, is superficially formed, affording protection against the formation of rust. We have had occasion to examine specimens of the shafting referred to, which shows in a characteristic manner the presence of the coating thus obtained, and which in conjunction with the other peculiarities noticed, render it worthy of the attention of those interested.

A NEW SCREW.—It is a well-known fact that the great bulk of the screws used are driven in with the hammer, and given a turn or two with a screw-driver, to bring them flush. Recognizing this fact, an ingenious inventor, for many years somewhat prominently identified with the business, has brought out a new screw, which is adapted for driving, and which enters the wood without tearing the grain. The gimlet point is dispensed with, and a cone point substituted. The thread has such a pitch that it drives in barb fashion, offering no resistance in entering, but firmly resisting all attempts to withdraw it except by turning it out with the screw-driver. The head is flat, but in setting it up two nipples, or square-shouldered projections, are raised in it by the one operation. The screw-driver takes hold of them more easily than it does of the customary nick, and holds quite as firmly, and when driven flush the projections on the head are not in the way, and do not disfigure it. It is claimed that this screw can be made one-third cheaper than ordinary screws, the principal saving being effected in the doing away with the necessity of sawing the nick in the head.—*Design and Work.*

A NOVEL HORSESHOE.—A Berlin manufacturer is making a horseshoe of iron and hemp that is receiving considerable favor among the Germans. The shoe is of malleable iron, carrying a deep wide groove, into which tarred hemp rope is firmly wedged. The rope is so thick that it protrudes beyond the rim of iron. The shoe is very light, and is said to be serviceable.