

## Science and Art.

## History of Reaping Machines.—No. 25.

On the 25th of April, 1854, a patent was granted to Wm. F. Ketchum, of Buffalo, N. Y., (assignor to Rufus S. Howard,) for an improved method of making cast iron guard teeth for harvesters. The old method of casting iron teeth left the surfaces so chilled, and the slit for the cutter to play being so thin, it could not be made smooth. The improved tooth remedied this method of manufacture by casting each part of proper form, but with the parts on each side of the slit at a considerable angle to each other. In casting them thus, there is sufficient space between the shanks to admit of their being cast in an ordinary sand mold. After molding, they are malleablized and dressed up with ease, and the shanks closed and made ready for use. This is a cheap method of manufacturing such guard fingers, (see claim, page 267, Vol. 9, Sci. Am.) On page 299, same volume, are the claims of a patent for a clover harvester, granted to T. S. Stedman of Murray, N. Y., on the 23rd of May, 1854. The claims (six in number) of the re-issued patent of Nelson Platt, formerly of Ottawa, Ill., will be found on the same page. The assignees of this patent are Messrs. Seymour, Dayton, & Morgan, of Brockport, N. Y., (see illustration of this patent, on-page 160, this series of articles.)

On June 13th, 1854, Ira Reynolds, of Republic, Ohio, obtained a patent for a double series of double edged shear blades, supported at their rear ends by reciprocating bars, to which they are pivoted and regulated by set screws; also for a method of elevating and depressing the grain gatherer while the machine is in motion, (see claims on page 323, Vol. 9, Sci. Am.) On the same page is the claim of a patent granted to Bronson Murray, of Ill. (assigned to T. R. Spencer, Geneva, N. Y., assignor to J. S. Wright, of Chicago, Ill.) for making the rear serratures of the sickle-blade sickle edged, except the rear projecting points, which latter construction he disclaimed as being the invention of Henry Green. On the 27th of June following, a patent was granted to George Esterly, of Heart Prairie, Wis., embracing three claims; the first for making the sickle with projections on alternate sections; second, grinding off the feather edge made on the sickle by the cutting chisel; third, attaching a plow to the sickle beam, (see claims on page 342, Vol. 9, Sci. Am.) On page 412, same volume, there is the claim of a patent granted to A. Bruer, Mechanicsburgh, Ill., for a corn harvester, relating to an arrangement of oblique cutters and guide shafts. Arranging the cutters for making an oblique cut on corn stalks, is the correct mode.

On page 70, Vol. 9, Sci. Am., there is an illustrated article reviewing the claims of various inventors, in which the merits of their inventions are criticised. Two forms of cutters are shown, and three forms of guard teeth, viz: McCormick's, the common tooth, and Forbush's tooth. An answer to the said article, by J. M. Thomas, of Ill., was published on page 107. A beautiful perspective view, with a full description of Homer Atkins' automatic reaper and self-raker, will be found on page 41, Vol. 9, Sci. Am.; the date of the patent is Dec. 21, 1852.

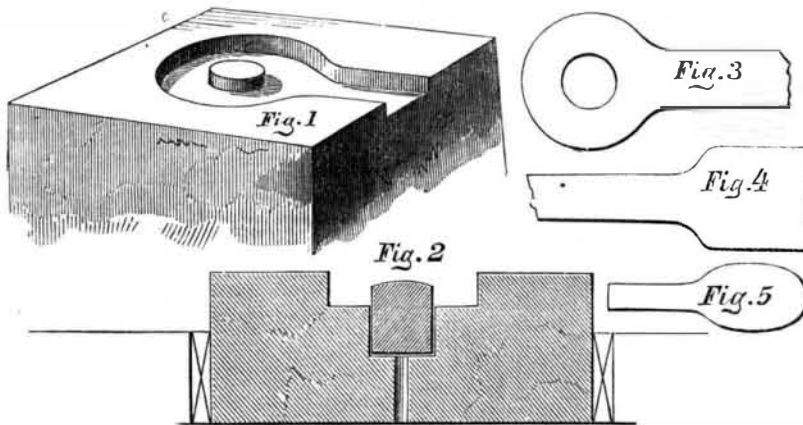
## Inspection of Mines in England.

Mr. Dickinson, the Mining Inspector for Lancashire, Cheshire, and North Wales, in his report ending the 31st Dec., says:—"The loss of life to persons employed in and about the whole of the collieries of Great Britain, as ascertained for 1851 and 1852, is averaged at 985 per annum. The total output of coals is not correctly known, but it may be stated at about 54,000,000 tons. The average loss of life, therefore, at this estimate, for the whole of Great Britain is one life per 54,822 tons of coal. In previous years the mortality was probably greater; many improvements as to the health and safety of the miner having been introduced into collieries by the passing of the act for the inspection of coal

mines, in 1850. Not more than three per cent. of the explosions of fire-damp occur in mines where safety lamps are professedly used. The ventilation of English coal mines is generally produced by a furnace, which being kept burning at the upper part of the upcast shaft, heats or rarefies the air, so that it ascends, whilst cold air necessarily descends another shaft into the mine to supply its place. In Belgium, where the science of ventilation is much better understood than in England, the furnaces are all being replaced by machines, which pump out the air, and are more economical.

For the Scientific American.  
Forging the Eyes of Suspension Rods.

In forging the eyes for the suspension rods of the roof of the Capitol Extension, we have used—for the first time, I believe—a mode of punching and swaging iron, which promises great rapidity and economy in all such work, such as in making the eyes for Bollman's bridges, for example. The eyes are forged



under a small Nasmyth steam hammer, and cut off. We use a die of cast iron with a steel center, as shown in figs. 1 and 2 (a perspective and transverse section,) and fig. 3, a view of the anvil block. The steel punch is slightly convex on top, and rises within a 1-4 inch of the top of the anvil. The eyes are 5 3-8th inches wide, with a 2 or 1 3-4 inch hole, to be bored afterward to 2 3-8 inches. The bench is 2x1-2 inches. They are forged from 4x1 inch rolled iron, all the work being done by a 500lbs. steam hammer. Had we two such hammers, it could be done at one heat; but having only one, the shanks are drawn out and the eye cut off, as represented by fig. 4. This is taken by another smith, who heats it a little, places it under the hammer, and works down the corners, reducing it to the shape fig. 5. One man can shape as fast as two can draw and cut off, and three fires keep the hammer busy. After they are thus roughed out, the common hammer and anvil block are removed,

and a large faced hammer block, and the anvil with the recessed face substituted. The first effort in placing the hot iron over the die, is to spread the iron above the steel center pin, and swage the eye, thus increasing its diameter. As soon as the iron is forced down into contact with the bottom of the die, it is turned over and hammered with the other side up; the impression is now made on the other side, and the blank is loosened; one or more turns, and a few blows of the hammer, so loosens the blank, that a light tap with a hand hammer drives it out, and the eye is completely finished. The edges of the die of the center pin have a little draw to prevent the eye from sticking. The whole operations are rapid and easy to the workmen, and, beside, the process is economical. The eyes, like all work made in dies, are exactly alike. The waste and chipping amount to about one pound in a hundred—a very

small amount. The economy of this mode of manufacture in making Bollman's Bridges, must amount to many thousands of dollars in a large bridge, and I only wonder that any one with a steam hammer did not fall upon it the first time he tried a heavy job. To Mr. Samuel Champion, foreman of our smith's shop, belongs the credit of this mode of working the iron. I desired him to prepare dies to work the eyes, when he suggested a print, as a guide in punching them, which we intended to do by hand. The effect of this print, which was only about the eighth of an inch deep, showed that by making it a little deeper, the eye would be punched. The steel pin was then adopted, and the results you have in the foregoing. M. C. MEIGS. Capt. of Engineers in charge of the U. S. Capitol Extension, and of the Washington Aqueduct.

## British Railways.

The traffic returns of British railways in 1854, show an aggregate of 18,541,855*l.* on 7,300 miles of railway, being at the rate of 2,604*l.* per mile. In addition to the published returns, there were receipts upon 792 miles of railway amounting to about 1,458,670*l.*, which, with the above sum of 18,541,855*l.*, makes a total of 20,000,525*l.*, as the traffic receipts for railways in the United Kingdom in 1854. The length of line open for traffic at the end of the year, was about 8,028 miles, the traffic receipts on the whole being at the rate of 2,491*l.* The cost of construction amounted to 273,860,000*l.*, being at the rate of 34,020*l.* per mile. The total receipts on 7,700 miles in 1853 amounted to 17,920,530*l.*, showing an increase in favor of 1854 of 2,079,995*l.*, or above 11 per cent. The published traffic returns of railways in 1843 amounted to 4,843,000*l.*, yielding an average receipt of 3,045*l.* per mile; and in 1854 to 18,541,000*l.*, yielding an average receipt of 2,604*l.* per mile. The capital expended on these lines up to July, 1843, amounted to 57,635,100*l.*, and in 1854, on the lines in question, to 255,610,000*l.*, showing an increase in the annual traffic of 13,698,000*l.*, and in the capital expended of 197,974,900*l.* The mileage has increased during that period from 2,000 miles to 8,000 miles, and the average cost per mile remained about the same, varying from 34,000*l.* to 35,000*l.* per mile. The total length of British railways is about one-

third that of the United States, but their cost of construction, we are positive, is three times more, amounting, in round numbers, to \$1,278,050,000.

## Coal of Pennsylvania.

One amongst the many remarkable instances of the fruits of labor judiciously applied to mining, we find furnished by the Pottsville Register, in the account of the proceedings at a presentation of plate to Mr. E. W. McGinnes, of that place.

A few years ago, E. W. McGinnes, of Pottsville, with many others, became impressed with the opinion that the great white-ash coal veins of the Broad Mountain range ran under the red-ash series of the Schuylkill basin; and believing, as he did, in consequence of the numerous anti-clinical axes which occur in that basin, that these white-ash veins could be reached at a depth not too great for practical and economical working, he boldly commenced sinking a gigantic perpendicular shaft, on the estate of Messrs. Carey & Hart, at the village of St. Clair, about two miles north of Pottsville. After penetrating a number of valuable veins, in his descent into the bowels of the earth, he finally struck, at a depth of some four hundred and thirty feet from grass, the celebrated mammoth white-ash vein of the Broad Mountain, affording, at this spot, thirty feet of solid coal! The truth of this interesting theory, though long entertained by the colliery miners and geologists, but with serious doubts as to its

practical value, was thus completely demonstrated and established, and the natural effect of it will be, of course, to add very largely to the value of coal lands and the coal trade of this extraordinary region.

## Work in the Country.

A correspondent writing to us from Buffalo Grove, Ill., states that there is plenty of work for faithful laborers in Northern Illinois, that wages are high, and provisions plenty and at reasonable prices. Some of the suffering poor in this city, who are disposed to labor, he believes would do well to go out there.

## LITERARY NOTICES.

L'INVENTION—This is the title of a monthly journal of Art, Science, and Mechanics, conducted by M. Gardissal, No. 29 Boulevard St. Martin, Paris, France. It is a very useful publication, and faithfully illustrates the progress of invention in France. It embraces the subjects of mechanics, chemistry, and agriculture, with numerous engravings. Mr. Gardissal is assisted in his labors by the Messrs. Tolhausens, who bring to the work much ability and scientific research. The Technological Dictionaries advertised on another page, are published by the same concern. They are very useful publications and ought to be possessed by every student.

THE NORTH BRITISH REVIEW—The republished number of this most able Review, for this quarter, has just been issued by Messrs. Leonard Scott & Co., No. 54 Gold street, this city. It contains nine grand articles on different subjects, all of great interest, and stamped with learning and genius. This Review is marked with a sound religious and freedom-loving spirit. It contains an able article on the Electric Telegraph, the substance of which we shall present next week.

GAUGER'S HAND BOOK—This is a very neat little book, dedicated to John Cochrane, Surveyor of the Port of New York. It gives a great amount of useful information respecting the measuring of liquids in vessels. It is a complete and concise treatise on Gauging as practiced by the gaugers of the Customs at the Port of New York.

NELSON'S AMERICAN LANCET—This monthly Journal of practical medicine, published and edited at Plattsburgh, N. Y., by Dr. Horace Nelson, always contains a great amount of original and useful information. The number for this month continues the Report of Dr. Bedford's Clinical Lectures in the University of this city.

THE NATIONAL MAGAZINE, for April, is a fine number; we cannot speak in terms too high of this excellent monthly: the tone is christian, and is elevated above the common trash of the day. Carlton & Phillips, publishers, New York.

NATIVE AMERICAN REVIEW.—A new monthly with this title has made its appearance, and, as its name imports, will advocate "American" principles, taking for its motto "Americans shall rule their country." It differs somewhat in its style from other monthlies published in this country, being more like the English quarterlies in its arrangement. Its general appearance is very creditable, and to judge from the contents of this first number, it will prove a valuable addition to our current literature. It is published by J. W. Moore, 193 Chestnut street, Philadelphia.



## Inventors, and Manufacturers

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