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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 418,

For the Week ending January 5, 1884.

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CONVERTING IRON ARTICLES INTO STEEL.

Some experiments, which may prove to be a valuable improvement, have recently been made in the manufacture of articles of iron to be afterward cemented or case hardened. The ordinary case hardening as usually applied is too well known to require more than a mention, but the experiments to which allusion is made refer to the production of articles of iron which are usually made direct from steel, especially springs—coiled, spiral, and flat. It is well known that in winding a coiled spring to any desired diameter allowance must be made for the back lash or reflexion of the wire, and the core upon which it is wound must be considerably smaller in diameter than would be the case if the wire when wound and released retained its position in its coils. In these experiments the workman used tough Swedish iron wire, or that made of similar iron adapted for conversion into steel. The iron is as soft as lead, so far as regards the absence of elasticity, and will "stay put" in any coil or crook. It will even coil around a flat bar, making a flat coiled spring, an impossibility with hard drawn brass or tempered steel wire. Every mechanic knows that a flat coiled wire spring would be a pleasant possibility on many a job where now a round coiled spring is the only possibility. But a hard wire wound on a flat bar would, when released, present a Jacob's ladder cross section unfit for any mechanical use.

When the spring is formed it is cemented, or case hardened by being packed in a box or crucible with bone charcoal or ferrocyanide of potassium (prussiate of potash) and subjected to the usual case hardening heat. It is hardened in a bath of animal oil, and drawn to the spring temper by the usual blazing process. Except the wire is of very small diameter only the outside is converted into steel, the core of the wire still retaining its tough iron property. A spring of No. 8 wire, American gauge, when cut, showed merely a skin of case hardening, or steel conversion, but the spring appeared to be as active as one made from the same gauge of steel wire, thus sustaining the views of many mechanics that it is only the exterior of a spring that performs the functions due to elasticity.

If this process of wire spring making proves to be reliable generally, with only as small a proportion of failures as the present method, it will supersede the common way of winding hard drawn iron and brass or tempered steel wire, as the spring may be made from the soft iron wire to exact size and to any required shape, and coiled springs of tested tension and required diameters may be made and kept in stock to be furnished to users as required. If this is possible it will not only create a new industry, but will relieve machine shops from the annoyance of winding wire springs, a department of work that occasions the loss of valuable time and the waste of large amounts of wire. An attempt has been lately made to cut file blanks of soft iron to be afterward converted on their surfaces, and it is possible that this method of converting or case hardening finished articles may be still further extended to advantage, especially when hardness of surface and toughness of interior may be desirably combined.

HEAVY WORK WITH THE DIAMOND DRILL.

We have lately seen samples of cores cut by the diamond drill that are marvelously curious. Sections of rock and ore drawn up from hundreds of feet below the surface showing the stratification and its inclination, with all the varieties of its composition; the veins of ore and its boundaries and dip as well marked and better measured than if the miner was down in the depths of earth sending up his samples; and what is more valuable, the diamond drill sends up the samples partly polished—so smooth is its cut that you have but to wet the core to bring out all the variegated hues of rock and ore. It matters not as to size—one inch to two feet is within the grasp of the modern explorer. Truly we are passing into the diamond age.

DOES NOT WANT TO BE GRAMMARED OUT OF HIS INVENTION.

A correspondent who is a practical worker and an ingenious inventor, but not a man of letters, is at present going through the ordeal of a suit which he has brought against a rich railway corporation for infringement of one of his patents. He complains of the twists and strains in which the lawyers and judges seem to indulge over the wording of the patents, by which means they try to jew the patentee out of his rights, and among other things says: "I think whatever is *new* about a patent belongs to the one who has the patent, whether there is a special claim on it, or its parts, or not; and they can't grammar me out of it; for I think I have not got to put my name on every spear of grass in order to own a meadow, whether I mention the word lot or not in my deed or patent."

Our correspondent's idea is a good one. An inventor ought to be protected in the enjoyment of whatever is new and useful in his patented invention, and ought not to be deprived of the fruits of his labors because a sentence in his specification contains a word too much or too little. Our correspondent's idea is in accordance with the spirit of the Constitution, which provides for the issue of patents for the special purpose of encouraging the progress of the arts and sciences. Liberality, encouragement, and the broadest possible protection of the inventor should therefore be the aim of the courts and of the Patent Office. This the Constitution calls for. But some of the courts and some of the Patent Office officials occasionally seem to take exactly the opposite view, and appear to labor under the notion that it is their duty to discourage, limit, reduce, and nullify as much as possible the constitutional rights of authors and inventors.

ROBERT MACFARLANE.

Robert Macfarlane was born in Rutherglen, near Glasgow, Scotland, April 23, 1815, and died of paralysis in Brooklyn, N. Y., December 21, 1883. His school education was limited to that which was furnished by the parish school of his native town; but he early formed good habits of study, which grew upon him through life.

In 1836, at the age of twenty-one, after having learned the trade of dyer in his father's dye works at Paisley, he sought a new home in the United States, and since that time he has resided in the State of New York. In 1840 he took up his residence in Albany, and soon made his mark among the intellectual and public spirited citizens. Here he was editor of the *Mechanic Mirror*, the organ of a New York State association in the interest of the artisan classes. His able management of this paper led to his appointment, in 1848, as editor of the SCIENTIFIC AMERICAN, and he occupied this position for seventeen years, with the eminent approval of his associates and the patrons of the paper.

In 1865 he was threatened with a failure of eyesight, and felt obliged to suspend writing and study and to seek other employment. He returned to Albany, and there set up a business as dyer and practical chemist; the business was quite successful from the beginning. In 1874 he retired from the active management of the dyeing establishment in favor of his two sons, who have since carried it on and maintained its high reputation. Since 1874 Mr. Macfarlane has resided most of the time in Brooklyn, and free from the cares of business.

He revisited Scotland twice, in 1839 and in 1875. The last visit was described in a series of sketches under the title of "Rambles in Scotland," published in the *Scottish-American Journal*. The sketches were widely read in the United States, and were reproduced in Scotland. Mr. Macfarlane was the author of a History of the Screw Propeller, and was editor of an elaborate Treatise on the Art of Dyeing, both of which were published by John Wiley, of New York. He also has a high repute in Scotland and America as a contributor to literature relating to Scottish antiquities and to the history of Scottish emigration to America. He often used the *nom de plume* Rutherglen.

Mr. Macfarlane was a man of exalted moral character, and his integrity was probably never suspected by any one who was acquainted with him.

Rapid Settlement of the Great West.

The *Financial Chronicle* has an important article on "Government Land Sales," showing the amount of public lands disposed of during the past six years in the several States and Territories, as indicating the direction in which population is moving. The total number of acres disposed of in the year 1883 was 16,830,455. The table of largest sales, in the order of magnitude, is as follows:

	Acres.
Dakota	6,689,595
Nebraska	1,315,104
Minnesota	1,292,969
Kansas	808,655
Washington Territory	763,779
California	704,274
Mississippi	516,511
Oregon	499,770
Louisiana	487,599
Arkansas	460,656
Wisconsin	454,002
Florida	434,749

Texas is not embraced in the list, as the United States have no public lands in that State. The list includes lands sold for cash, and taken under the Homestead and Timber Culture acts. The sales for six years have been as follows:

	Acres.
1878	6,855,781
1879	8,649,259
1880	9,090,495
1881	8,379,518
1882	12,526,262
1883	16,830,455

The increase of sales during the past two years has been very marked, being at the rate of 50 per cent in 1882 over 1881, and 40 per cent in 1883 over 1882. This extraordinary addition to the producing power of the nation, the *Chronicle* argues, must soon tell favorably on the existing business depression, for although the opening of new territory cannot be expected to show full results in the first or even the second year after settlement, "yet when it is remembered that during the two years since the depression set in, more than twenty-nine and a quarter millions of Government acres have been entered upon, it will readily be seen what a wonderful recuperative power this continued opening of new territory offers."

Electric Conductivity of Sulphur.

A professor at one of the French *lycees* has discovered that though sulphur is an insulating material at its ordinary temperature, it becomes a conductor as soon as it is heated. Its conducting power increases with the temperature, and at the fusing point is very considerable. At 320° Fahr., at which point sulphur changes its physical condition and becomes pasty, the conducting power diminishes, but increases again when the substance has attained perfect fluidity. Similar facts have been noticed with regard to phosphorus.