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THE SCIENTIFIC AMERICAN SUPPLEMENT,

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FIELD AND FOREST FIRES.

During the fire week of September a large part of two counties and a portion of adjoining counties in the triangle between Saganaw Bay and Lake Huron, in the eastern part of Michigan, were swept by fire, destroying not only the remaining forest, but many small villages and a large number of the outlying houses and barns of the settlers. In the newer districts everything was destroyed and many lives were lost. Much of the country had but recently been cleared, and everywhere there were large areas covered with brush and other food for fire, thoroughly dried by the long-continued drought. For two months there had been little or no rain, and as usual small fires were burning almost everywhere. On Monday, September 5, a high wind arose, and for several subsequent days everything was aflame. The volume of fire was so great that the ordinary means of resistance were useless; woods, fields, villages, farm buildings, fences, crops, live stock, and their hapless owners were overwhelmed without chance of escape. Whole families were burned in their houses, or in the fields and roads while flying for refuge, or smothered in wells, their only resort from the flames which swept the surface. The Mayor of Detroit estimates that 750.000 acres were burned over, and as many as 15,000 persons made homeless and destitute. The whole area of the afflicted district was perhaps 10,000 square miles, with a population of 50,000 or more. Most of the people were new settlers, just getting a start in life, though the loss of property in the older settlements was heavy. The immediate loss of life is estimated at from three to five hundred. Many more were seriously if not fatally burned, and the exposure of houseless and bereaved women and children entailed great additional suffering, if not hazard of life.

Thanks to prompt and liberal contributions from Eastern and Western cities, much has been done for the relief of the victims; but hundreds have been impoverished, and years must elapse before the lately prosperous settlements can regain their lost position.

Lessons of this nature, happily not so severe, occur almost every year, certainly every dry season, teaching the unwisdom of the common practice by new settlers of surrounding themselves with materials for future conflagrations. Forests are cleared, and vast accumulations of brush, tree limbs, waste lumber, and the like are allowed to form on all sides. At last there comes the inevitable drought, with a chance that the rubbish will not yield to small and isolated fires. Ordinarily the brush fires are confined to the clearings, and are easily kept under control. Occasionally, as in the recent instance, and similarly ten years ago, a general conflagration ensues, and a terrible price is paid in property and suffering and loss of life for the neglect to burn the brush-heaps in detail and at seasons when they will not burn so readily.

It is only by concerted action on the part of all the members of a new settlement that this serious hazard of their lives and properties can be kept down, and it would seem possible that something in the way of general legislation might be devised to compel wood-cutters to clear up and burn up their rubbish as they go along. Without such laws for all wooded regions we must expect the periodical recurrence of calamities such as has now overtaken Eastern Michigan.

METALLURGY OF NICKEL.

At the recent exhibition of the German patents and designs the metallurgy of nickel and cobalt was illustrated in an interesting manner by Fleitmann & Witte, of Iserlohn. Dr. Kollmann describes it as follows:

It is only within a few years since the discovery of pure malleable and weldable nickel by Dr. Th. Fleitmann, that nickel has entered the rank of those metals which are technically employed on a large scale. Previously only the alloys of nickel with copper and other metals could be easily wrought, while pure nickel could neither be hammered nor rolled. The reason of this was that pure nickel absorbs (occludes) gases while melted (Fleitmann thinks it is carbonic oxide), and the nickel cannot be worked until these gases are removed.

Fleitmann's process for making nickel malleable consists in adding a very small trace, only one-twentieth of a per cent of magnesium, which is introduced in the form of a bar into the liquid nickel while in the crucible. This small percentage of metallic magnesium renders this brittle metal perfectly malleable, and it can even be welded. Magnesium is well known to oxidize very easily (at high temperatures) and hence serves to remove these injurious gases. (Would not phosphorus accomplish the same end?)

The extraordinary technical importance of the new discovery (which is already patented in all countries) is evident at once. Formerly alloys with comparatively only a little nickel could be used, say, for coin. The German 10 pfennig pieces (like the American 5 cent piece) contain only 25 per cent of nickel to 75 of copper. Now, on the other hand, we can have pure nickel cast in any desired shape, and also forge it and roll it like iron or steel. We may, indeed, assume with tolerable certainty that if Fleitmann's method had been known ten years ago we Germans would not have been pestered with our unhandy little 20 pfennig silver coins, for much more convenient ones could have been stamped from pure malleable nickel. Pure nickel, in addition to its malleability, possesses the great advantage that it does not lose its luster in moist air and is unaffected by organic acids, while its alloys, we know too well, gradually lose their luster and turn reddish.

Fleitmann, in his very interesting investigation, also made the discovery that pure nickel treated with a very little magnesium became weldable just like iron, and upon this he founded a method of welding nickel to iron. This discovery has gained very considerable importance, since we are now able to weld plates of nickel on both sides of the iron or steel instead of merely depositing on it a thin coating by electricity.

The question of welding, which is not yet settled in the metallurgy of iron for Bessemer metal, for example, may perhaps be solved in a manner similar to that in which Fleitmann solved it for nickel. Its importance technically and economically hardly can be overestimated. Nickel made by the new process with magnesium has a resemblance to carbureted malleable iron.

Kollmann made a series of tests of strength with Fleitmann's nickel, and arrived at a surprising result, namely, that the elasticity as well as the absolute strength corresponds exactly with those of medium hard Bessemer steel.

The expansion by rolling and forging of the two metals is the same, so that they can be rolled together.

Kollmann then gives some of the numerical results of his tests, which we omit, but they go to show that the physical properties of nickel and iron are very analogous, so that the thought arises that perhaps nickel is, after all, only an allotropic state of iron!

Since nickel and steel expand equally, blocks of nickel can be welded on both sides of an ingot of steel, and the whole rolled out into sheets of any desired thickness already covered with nickel. Iron wire covered with nickel could be drawn out just like ordinary wire. Another advantage is that the welding as well as the melting temperature of steel and nickel is close together, so that the nickelized steel can be welded as before.

Cobalt can be rendered malleable and weldable in the same manner, *i. e.*, by the addition of a little magnesium.

Fleitmann has also discovered that not only can nickel and cobalt be welded on steel and iron so as to form nickel plated wire and sheets, but that it can be welded on to the alloys of copper and nickel, which can be rolled at a very high temperature. In this operation the metals to be welded are surrounded with thin sheet iron, which is afterward dissolved off, or is heated in an air-tight apparatus. In this way, too, sheet iron can be combined with alloys of copper and nickel by welding.

To prevent articles made of nickeled steel or iron from rusting on the cut surfaces the iron beneath is dissolved away at the edges with dilute acids, and the projecting nickel then hammered down and welded over it. In Birmingham H. Wiggin makes nickel malleable by adding 2 to 5 per cent manganese.

THE GERMINAL VALUE OF NEW TRUTHS.

In his presidential address before the recent Medical Congress in London, Sir James Paget dwelt at considerable length upon the necessity of special studies in science and the impossibility of making any just comparative estimate of the relative value and importance of the several divisions of the science of medicine, or any other science, however widely they may seem to differ in present utility. This mainly for the reason that every fact in science, wherever gathered, has not only a present value, which we may be able to estimate, but a living and germinal power, of which none can guess the issue. The speaker added:

It would be difficult to think of anything that seemed less likely to acquire practical utility than those researches of the few naturalists who, from Leeuwenhoeck to Ehrenberg, studied the most minute of living things, the Vibrionidæ. Men boasting themselves as practical might ask, "What good can come of it?" Time and scientific industry have answered, "This good: those researches have given a more true form to one of the most important practical doctrines of organic chemistry; they have introduced a great beneficial change in the most practical part of surgery; they are leading to one as great in the practice of medicine; they concern the highest interests of agriculture, and their power is not yet exhausted."

And as practical men were, in this instance, incompetent judges of the value of scientific facts, so were men of science at fault when they missed the discovery of anæsthetics. Year after year the influences of laughing gas and of ether were shown: the one fell to the level of the wonders displayed by itinerant lecturers; students made fun with the other. They were the merest practical men, men looking for nothing but what might be straightway useful, who made the great discovery which has borne fruit not only in the mitigation of suffering, but in a wide range of physiological science.

The history of science has many similar facts, and they may teach that any man will be both wise and dutiful if he will patiently and thoughtfully do the best he can in the field of work in which, whether by choice or chance, his lot is cast. There let him, at least search for truth, reflect on it, and record it accurately; let him imitate that accuracy and completeness of which I think we may boast that we have, in the descriptions of the human body, the highest instance yet attained in any branch of knowledge. Truth so recorded cannot remain barren.

THE second-class steel armor-plated turret ship and ram Conqueror was launched September 8, at Chatham, Eng. She is of 6,200 tons, and her engines are of 4,500 horse power. Her armament will be two 25-ton guns.