growth of the negative carbon is in general due to an excess of current. Additional resistance in the circuit of the lamp will remedy it.

(7267) H. A. C. says: Will you kindly publish in your valuable paper a recipe for tempering wood cutting tools in oil? A. Wood cutting tools are usually made somewhat softer and with more of a spring temper than the thicker edge of metal cutting tools. The process is the same for both, but the temper is drawn lower or to a bluish tint. For wood cutting tools hardened in oil a slow fire should be used, so as not to burn the corners and edges by overheating. Heat to a cherry red and quickly plunge, edge first, in the oil bath. While the thick part of the tool is still hot, place it over the fire and slowly heat until the oil takes fire, then plunge again in the oil bath or water. The bluing process of tempering is much used, and is done by cleaning the surface of the hardened part of the tool with emery paper and then heating by contact with a piece of red hot iron just back of the cutting edge. When the color has reached the blue tint, plunge it in water.

(7268) S. A. S. asks: 1. If a cubic inch of water, in passing over a hot metallic surface, absorbs a certain amount of heat, how many cubic inches of air will have to pass over to absorb the same amount in the same time? A. Water will take up about four times as much heat as air under the same circumstances, the air to be free, that is, not under pressure except atmospheric pressure. 2. What I wish to get at in the above question is really the proportion between the conductivity of air and water. A. This is an entirely different question, though apparently not meant to be. The experiments are not very conclusive as to the relative conductivity of air and water, but it may be stated somewhat roughly that the conductivity of air is from $\frac{1}{30}$ to $\frac{1}{21}$ that of water.

(7269) R. W. S. asks how to make a copying and enlarging camera and desires to know how a suitable combination of spectacle lenses can be made to have only 4 inches focus, yet of sufficient covering power to enlarge a 4×5 negative to an 8×10, and where and what stops should be used? A. A concavo-convex single spectacle lens an inch and a half in diameter can be used with a stop ⅛ of an inch in diameter located in front of the lens about one inch. The focus of the lens should not be less than six inches. See SUPPLEMENT, No. 1081, for a reducing and enlarging camera.

(7270) F. F. asks (1) if it is practical to build the dynamo described in your SUPPLEMENT, No 600, three-fourths the given dimensions. If so, what changes are necessary in the size and amount of wire, and what will be its output? A. The dynamo of SUPPLEMENT, No. 600, can be built three-fourths as large as the given dimensions. Use No. 23 A. W. G. for the armature and No. 21 for the field. Wind the same number of coils and turns in each as called for in the original design. 2. What power will it have if run as a motor, and how many cells of Partz gravity battery will be required to run it? A. It will give about ¼ horse power as a motor. It would not be economical to drive it with gravity cells. 3. Is it possible to run such a motor on an incandescent alternating circuit? A. A direct current motor cannot be run on an alternating circuit.

(7271) A. J. P. writes: In reference to the answer given to E. E. S. in Notes and Queries, question No. 7242, in the SCIENTIFIC AMERICAN for November 27, I would respecfully call your attention to the fact that a change in the strength of the needle would not change the value of one ampere on the scale. To quote W. E. Ayrton in his "Practical Electricity:" "The deflection produced by a given current passing through a tangent galvanometer is not altered by varying the strength of the magnetic needle. . . . For altering the strength of the needle alters the deflecting and controlling forces in exactly the same proportion, so that the direction of the resultant of these two forces remains unchanged. A. A. J. P. is correct. It is a well known fact that the law of the current for the tangent galvanometer is $C=\frac{Hr}{2\pi u}\tan a$ --a formula which contains no factor dependent on the needle. In other words, the strength of the needle is not involved. The only condition affecting the needle is that it should not be longer than from one-tenth to one-twelfth of r, the radius of the coil.

NEW BOOKS, ETC.

BIRD NEIGHBORS: AN INTRODUCTORY ACQUAINTANCE WITH 150 BIRDS COMMONLY FOUND IN THE WOODS, FIELDS, AND GARDENS ABOUT OUR HOMES. By Neltje Blanchan. With introduction by John Burroughs, and fifty plates of birds in natural colors. New York: Doubleday & McClure Company. Pp. 233. Price $2.

In the preface to this truly sumptuous volume the author acknowledges indebtedness to all the time-honored standard authorities, and to many ornithologists of the present day, as well as the fact that the manuscript was read and annotated by Mr. John Burroughs. The book makes the identification of the birds described simple and positive, all the birds being grouped according to color, as being the first and often the only characteristic commonly noted, while according to another classification the birds are grouped according to their season. Supplementary chapters deal with family traits and characteristics and tell which groups of birds show preferences for certain localities and where to look for others. The fifty colored plates are most beautiful and accurate, the brilliancy of the coloring being perhaps more conspicuous than will be found in some of the standard authorities, a fact which the writer explains by saying that the specimens examined and described were not the faded ones to be seen in museums, but live birds in their fresh spring plumage, studied afield. Such books as this one add new interest to life, for, as Mr. Burroughs says, "the birds link themselves to your memory of seasons and places, so that a song, a call, a gleam of color, set going a sequence of delightful reminiscences in one's mind."

LIGHT: VISIBLE AND INVISIBLE. A series of lectures delivered at the Royal Institution of Great Britain, at Christmas, 1896. By Silvanus P. Thompson. New York: The Macmillan Company. London: Macmillan & Company, Limited. 1897. Pp. 294. Price $1.50.

This is an extremely valuable work, giving interesting experiments, many of which appear to be new. Many of the ideas which must be grasped in considering light, for example the polarization of light, are popularly supposed to be extremely difficult; whereas the difficulty lies in the ideas themselves as much as in the language in which they are generally set forth. In an experience lasting over a good many years, the author has found that the main points in the phenomena of polarization are quite easily grasped by persons of ordinary intelligence—even by children—provided they are presented in a modern way devoid of pedantic terms and illustrated by appropriate models. The lectures are as follows: Light and Shadows; The Visible Spectrum and the Eye; Polarization of Light; The Invisible Spectrum (Ultra Violet Part); The Invisible Spectrum (Infra Red Part); Roentgen Light. The few pages devoted to magic mirrors are most interesting, as is also the chapter on Roentgen light. The collection of Roentgen photographs is interesting. In the appendix to the last lecture a number of other kinds of invisible light are considered. They are Becquerel's rays; phosphorus light; light of glow worms; Wiedemann's rays, paracathodic rays; diacathodic rays, and Goldstein's rays. It will be seen from what has been said that the book is without doubt the most thoroughly up to date treatise upon the subject of light, and the great reputation of Prof. Thompson is the guarantee of scientific accuracy of statements.

THE INDUSTRIAL LIBRARY OF MACHINE DESIGN. Issued in 12mo form at 25 cents per number, fully illustrated.

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NOVEMBER 30, 1897,

AND EACH BEARING THAT DATE.

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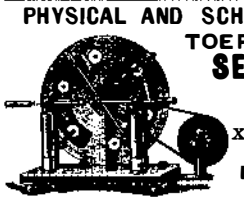

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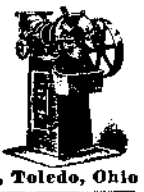

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