tory or motatory nerves is exceeded in rapidity by the flight of the swallow or eagle.

The compilation is of direct practical value, as it gives not only the highest admissible velocities, but also those that are the most advantageous in running a large number of the mechanical appliances in common use.

EXTENSION OF PATENTS. VALUE OF THE INVENTION.

To one who is conversant with the proceedings of the Patent Office upon application for the extension of patents, it is painful to observe how many of them fail, though they deserve success, because the requisite formalities have not been well understood and observed. While it is often obvious that the patent ought to be renewed, yet the privilege has to be denied, because the proper information has not been furnished to justify the Commissioner in granting it.

Before acting favorably in such cases, he ought to be satisfied, for instance, that the invention covered by the patent is of sufficient importance to warrant his action. It is a very common incident to find the device wholly frivolous, or so poorly adapted to practical use as to be of no value whatever. Yet the patent for it may stand in the way of others who are endeavoring to achieve some highly useful improvements, but cannot bring them to perfection without infringing the patent. It not unfrequently happens, also, that the patentee has received a greater or less sum from his invention, and the question will arise whether that is not as large a remuneration as his invention is entitled to. There are abundant reasons, in short, why the petitioner should make the value of the invention to appear. Accordingly the applicant for an extension is required in every instance to give a detailed statement of the value under his own oath, and to corroborate it by the evidence of disinterested witnesses. Something more is intended by this than a naked averment that the invention is worth a certain specified sum. The Commissioner should have the means of judging for himself what it is worth. The data should be furnished upon which he can decide for himself, and form an intelligent estimate of his own. Otherwise he might just as well take the petitioner's naked assurance that the invention is of sufficient value to entitle it to an extension.

The most satisfactory way in which this requirement is usually met is to show how many machines (if such is the invention) have been built and put in operation under the patent, and what is the net gain per day, or year, of running such a machine over those of the same kind which were known before. It can generally be made to appear that the products are so many more in number, or are worth so much more. If these statements are confirmed by disinterested witnesses, they constitute data from which a very fair calculation of the value of the invention can be made, and one that can usually be relied on.

When the invention is merely an improvement on some old instrument, a similar course can be pursued, and a comparison instituted between the instrument without the improvement, and the new one which embodies it.

It sometimes happens that, through poverty or injudicious sale of the invention, the patentee has been prevented from introducing it into use, as he might otherwise have done, and hence cannot furnish such a statement. He should explain this in making his application, and should satisfy the Commissioner by other means how much more valuable his machine is than others intended for the same purpose, and also whether it would go into use if he should obtain an extension of his patent. He may by these means furnish the Commissioner with good grounds for granting his petition.

These examples may serve to illustrate the measures necessary to be taken in order to establish the importance of the invention, to show that the patent deserves to be prolonged, and that the remuneration already received is less than the patentee is justly entitled to. The point to be kept in view is to furnish the Office with such information as will enable it to form an independent judgment upon the subject. The facts are what are wanted, not the opinions of others The affidavits of the most skillful experts that the invention is worth any particular sum, or is of great consequence, are of no use, because they undertake to substitute the estimates of other men in the place of those who have been designated by law to exercise their own facilities in forming the estimates to be acted upon. No one would think of asking a judge sitting in a court of law to rest his decision upon the views entertained by the ablest of his bar. Neither should the Commissioner, in determining whether a patent should be extended, be governed by the conclusions which any one else has formed, however competent he may be. His country holds the Commissioner responsible for what he decides, and relies on him for being guided by his own views.

A New Fuel for Locomotives.

The Russian Steamship and Railway Company announces that it has found the use of naphtha for steam generation, with locomotives, very advantageous. The material employed by the company is the crude oil from the Caucasian and Volga regions, and, compared by weight, the amount consumed was about one half that of coal. The arrangement for burning naphtha is stated to be of such a nature that no difficulty will be experienced in substituting one for coal consumption in place of it, should it be found desirable so to do.

Careful and repeated experiments made in this country during the past five years, in the burning of crude petroleum as a fuel for locomotives and ocean steamers, established the fact that the oil was a much dearer fuel than coal. Reports of these experiments will be found in the back volumes of the SCIENTIFIC AMERICAN.

Notes & Queries.

We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.

1.—PRINTING ON METAL.—Can any one inform me if printing with ordinary type can be done on polished surfaces of either brass or iron, and how?—T. S. R.

2.—INJECTOR.—Will any of your readers tell me how to make an injector for the boiler of a one half horse power steam engine?—F. W.

3.—PARASITE OF THE BLACK CRICKET.—I recently crushed a common black cricket, about three fourths of an inch in length; and there came out of the body of the insect a brownish colored water snake more than 9 inches long, about one sixteenth of an inch at the largest diameter or center, and about one thirty-second of an inch at the smallest, or neck, with some appearance of a head. It has lived now 48 hours in water, and there is no diminution of vigor. It is very active. The cricket was very lively with its strange burden which was packed into the body between the soft parts and the external shell. Can you tell me what the phenomenon means? Did the cricket swallow the snake, or did the snake originate there?—H. E. C.

4.—SAW MILL QUERIES.—I am about erecting a saw mill on a small stream, under a 10 feet head; and I propose using a center vent wooden wheel of 5 feet diameter, with 14 inches depth of bucket. What number of inches of water under that head will it be necessary to use to drive a 5½ feet circular saw at the speed of from 900 to 1,000 revolutions per minute with a capacity of 6,000 feet of lumber in 12 hours? What number of revolutions would such a wheel make per minute when laboring under the full capacity? Is there any system of feed works whereby feed can be regulated while the saw is running? I do not like the system of cone pulleys or the sliding belt cone feed. I wish to arrange so that I can change the cut of the saw to light or heavy feed, without shifting belts. If there is any such device, I would like to have a description of it.—P. P. S.

Answers to Correspondents.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

ALL reference to back numbers must be by volume and page.

MAKING WOOD AIRTIGHT.—O. S. C.'s query is too vague. Does he mean stopping the cracks in wooden buildings, or closing the pores of porous timber?

B. F. C.—The mineral you send is iron pyrites—sulphur and iron; it is of no special value.

W. M., of Minn.—We do not recommend the use of any patent eye cups for improving the sight. If we ever advocated their use, it must have been many years ago, when we were young and inexperienced.

THE TRANSPARENT LIQUID OF THE ORGANS OF VISION.—J. De W. C.'s suggestion can easily be tried by himself or the nearest photographer. How does he propose to make the liquid deposit a film?

RUST INDUCED BY SODA AND CHLORIDE OF LIME.—S. A. T., of Pa., should be careful not to leave any salts exposed to the air near bright steel goods. Chloride of lime will absorb moisture till all the chlorine is set free, and will then yield it again to the atmosphere.

REMOVING IRON RUST.—To R., query 1, page 122.—Put one half teaspoonful oxalic acid to one half teacup of water, and apply it to iron rust, fruit and other stains. Exposure to the sun will remove them. —Mrs. P., of Tenn. [Yes, and the acid will destroy the fabric unless washed off soon after its application.—EDS.

CHLOROFORM.—C. T. B., query 1, page 170, is informed that chloroform consists of three atoms of chlorine and one atom of formyl, which latter is a bicarburet of hydrogen. It may be thus called terchloride of formyl, and it has the formula

$$C_2HCl_3.$$

Its manufacture is always a complicated process, one of the simplest forms being as follows: Put three pounds chlorinated lime into two gallons alcohol of sp. gr. ·844; distil a gallon from this mixture, and rectify by redistillation, first from a great excess of chlorinated lime and afterwards from carbonate of potassa.—D. B., of N. Y.

THE JAWSHARP.—B. query 15, page 170, may be assured that the various tones of the jawsharp are caused by the different pressures of the breath on the tongue of the harp, which tongue is kept in motion by the touch of a finger. The vibration of the vocal organ would not affect it, unless the player sang on to the instrument.—D. B., of N. Y.

MILK AND INK STAINS.—P., query 3, page 170, is informed that the milk, being left to dry in the fabric, develops lactic acid, which is the only matter in milk that could affect an ink stain. I do not think an ink blot that had been dry for a few weeks could be affected by this acid.—D. B., of N. Y.

KOUMISS.—Query 4, page 170.—W. R. J. will find some difficulty in preparing koumiss unless he has access to a horse breeding farm. The genuine koumiss of Tartary is distilled from mare's milk while undergoing fermeatation, and the milk will yield the large proportion of 14 ounces of an alcoholic fluid for every 21 ounces milk. This fluid contains about 6 ounces alcohol. Cow's milk contains less saccharine matter, and consequently yields less alcohol in distillation.—D. B., of N. Y.

RUST JOINTS.—Query 9, page 170.—Has D. M. tried the effect of heat, applied externally, so as to expand the socket?—D. B., of N. Y.

SPONTANEOUS IGNITION.—To G. T. R., query 9, page 122.—Mix a tablespoonful of chlorate of potassium with about the same amount of brown sugar. If a few drops of ordinary sulphuric acid be poured on this mixture, it will ignite and burn with a beautiful violet colored flame, giving sufficient light for your purpose.—P. T. B., of N. Y.

SOLDERING LEAD.—To J. C. H., query 4, page 138.—Plumbers' solder is an alloy of 1 part lead and ¼ part tin; apply with an ordinary soldering iron, the joint having been first scraped clean and rubbed with tallow or rosin.—C. O. I., of Pa.