LUBRICANTS.—The evils attending the use of oils and fats as lubricants upon machinery are well known to engineers and mechanics, but the causes and nature of their injurious action are not so generally understood. We give, therefore, a brief but very lucid explanation of their action which we find credited to Dr. Marquardt, by our contemporary, the Boston Journal of Chemistry. The most obvious and least objectionable evil attending their use is the gradual oxidation (or gumming) which they undergo, and in consequence of which their lubricating qualities rapidly diminish. A more objectionable property of these substances shows itself when they are applied to such parts of machinery as are more or less highly heated. In such circumstances, these substances are decomposed into their constituents, glycerine and fatty acids. The latter combine with the iron work of machinery to form an iron soap, the metal surfaces being corroded thereby and fresh surfaces exposed to corrosion. Marquardt recommends the substitution of the mineral oils (heavy petroleum products that boil above 600° F.) for animal oils and fats as the remedy.

THE AMERICAN RAPID TELEGRAPH COMPANY is the title of a new organisation just formed to cheapen existing telegraphic rates. One of the novel inventions it is reported to centrol, but of which no published description has yet appeared, is a system of transmitting a fabulous number of words per minute. The following are among the reforms which the public are promised when the new organisation is once at work. (1.) Immediate dispatches (express messages) will be transmitted to all stations east of the Rocky Mountains at the uniform rate of 25 cents for 30 words. (2.) Mail messages will be dispatched within an hour, and delivered through the nearest post-office, or by messenger within two hours from time of reception, at 25 cents per 50 words. (3.) Press reports, for exclusive use of one-paper, at 10 cents per 100 words. (4.) Night messages to be delivered before 9 a.m., at 15 cents for 50 words. The company promise within three years to telegraph ordinary business letters to and from all points of the country for 10 cents.

PROPOSED CULTIVATION OF THE EGYPTIAN LENTIL.-Prefessor Anton Tomaschek, of Brunn, writes to impress upon agriculturists the great value as a food-stuff of the Egyptian lentil. From minute microscopical examination he has arrived at the conclusion, which we published years ago, that the meal of this seed forms the basis of the patent nutritive food so largely sold at altogether fancy prices under the name of "Revalesciero. The results of his experiments in growing this plant, continued ever since 1874, show that it thrives well in Moravia in soil of very moderate quality, and there is little doubt that it would succeed still better in the central and southern governments of Russia, where the conditions of the soil are even more suitable for its cultivation. The seeds of this kind of lentil are smaller and less at than the ordinary varieties, and are especially distinguishable from them by the reddish colour of their flesh, which appearance is maintained in the meal prepared from them.

THE War Department is on the point of at length adopting war balloons into the land and sea services. Movable apparatus for inflating and manipulating military balloons in the field has just been completed in the Royal Arsenal, Woolwich, and been tried with two new balloons, specially constructed for military purposes. The appliances consist of a portable tank, weighing 400 lb., containing iron shavings, together with a portable boiler and furnace. The appliances can be moved about with troops on the field or on vessels at sea. Hydrogen is generated by passing steam through the iron turnings. As soon as the accessary arrangements can be made it is in contemplation to send a few war balloons out to Zululand, so says Nature, but the fragments of one of the balloons are still missing. They are, it appears, not quite manageable war coaches.

ELECTROPHONE.—C. Ader uses a sort of drum, having on one side a diaphragm of parchment paper, about 15 cm. (5.9 lin.) in diameter, in the centre of which are circularly arranged six bits of tinned iron I cm. (374 in.) long, and 2 mm. (597 in.) wide. Upon these act six microscopic horseshoe electro-magnets, which are connected and set in action by a carbon-speaking microphone. A Leclanché pile of three elements transmits words and music so that conversation can be heard 5 meters (164 ft.) from the instrument. The energetic efforts are due to the minuteness of the electro-magnets, which can be magnetised and demagnatised much more rapidly than in other systems.

A NEW STEAM-PROOF CEMENT.—Dingler's Polytechnic Journal gives a description of the manufacture of a new steam-proof cement, discovered by Mr. A. C. Fox, which, it is claimed, is not affected by hot or cold water, nor by acids or alkalis. First,

a chromium preparation is made in the following manner: 2.5 parts, by weight, of chromic acid are dissolved in a mixture of 15 parts of water and 15 parts of ammonia. To this solution about 10 drops of sulphuric acid, and, finally, 30 parts of sulphate of ammonia and 4 parts of fine white paper, are added. When about to be used, gelatine dissolved in dilute acetic acid is added.

REQUIREMENTS OF A GOOD BOILER WATER.—Mr. W. F. K. Stock, in a recent communication to the *Chemical News*, defines the requirements of a good boiler water in the following terms : It should be characterized by : 1. Freedom from any very appreciable quantity of suspended mineral matter. 2. Absence of any trace of mineral acids, or of acid salts, or corrosive salts of any kind. 3. Absence of oily or fatty substance of any kind. 4. And, finally, a good boiler water should not contain more than 30 grains of solid matter per gallon, and not more than the half of this quantity should precipitate on boiling under pressure.

BOOTS AND SHOES WITH STONE SOLES.—The Engineer states that a German inventor proposes to make boots with stone soles in the following manner : He mixes a suitable quantity of clean quartz sand with a water-proof glue, and spreads it on a thin leather sole, which is employed as a foundation. These quartz soles are said to be flexible and almost indestructible, while they enable the wearer to walk safely over slippery roads.

CEMENT FOR CAST IRON.—Five parts of sulphur, two parts of graphite, and two parts of fine iron filings are melted together, taking care that the sulphur does not catch fire. The parts, previously warmed, are covered with the cement, reduced to a pasty consistence on a fire, and firmly pressed together. This cement, it is said, is very well adapted to fill out leaks in cast iron vessels.

FURNITURE POLISH.—The following I find very useful for family use:—1 oz. beeswax,  $\frac{1}{2}$  oz. white wax, 1 oz. Castile soap. The whole to be shred very fine, and a pint of boiling water poured upon it; when cold, add  $\frac{1}{2}$  pint of turpentine and  $\frac{1}{2}$  pint of spirits of wine; mix well together. To be rubbed well into the furniture with one cloth and polished with another.—WM. A. BRITTEN.

A method of breaking in horses by means of a galvanic battery was the subject of a recent patent in this country, and exception was taken to it as being both ineffectual and cruel. The experiment has been tried by the General Omnibus Company of Paris, and the scientific experts appointed to report upon the method declared that it is less cruel than the ordinary practice.

IMPROVEMENTS IN THE STEAM ENGINE.—Daney states that future improvement of the steam engine must be in the direction of remedying the following defects: The present small ranges of temperature, the waste of heat by radiation, the too ready heating and cooling of the cylinders and pistons, and mechanical inaccuracy.

PAPER BRICKS.—A manufactory of paper bricks has been started in Wisconsin. The bricks are said to be exceedingly durable and moisture-proof. They are also larger than the clay article. What next ?

## RECIPES FOR BLACK INK.

The following recipes from an exchange may be of use to some of our readers. The following is for jet-black steel-pen ink: "Bruised galls, 1 lb.; logwood,  $\frac{1}{2}$  lb.; cloves,  $\frac{1}{2}$  oz.; pomegranate rind,  $\frac{1}{2}$  lb.; water, 8 lbs. Boil gently for three hours, stirring now and then; strain off the decoction, and add 2 lbs. more water to the ingredients. Simmer gently for an hour, and strain. Mix the strained liquids, which together should weigh 8 lbs. Allow the dregs to subside, and pour off clear. Dissolve in a portion of it common gum,  $\frac{1}{4}$  lb., sugar candy, 1 oz.; and in another portion sulphate of iron,  $\frac{1}{4}$  lb. Strain both solutions, and mix the whole together. Then add calcined borax, 1 drm.; creasote, 12 drops; dissolved in  $\frac{1}{2}$  oz. of spirit of wine."

For blue-black ink the following is commended by good authority : Alleppo galls, bruised, 9 ozs.; bruised cloves, 2 drms.; cold water, 80 ozs.; sulphate o'. iron, 3 ozs.; sulphuric acid, 70 minims; indigo paste, 4 drms. Place the galls with the cloves in a gallon bottle, pour upon them the water, and digest, shaking often, for a fortnight. Press and filter again through paper into another gallon bottle. Next put in the sulphate of iron, dissolve it, add the acid, and shake briskly. Lastly, add the indigo, mix well, and filter again through paper. The ink is to be kept in well-corked bottles. The writing is at first pale green, but it soon turns to a deep jet black. It is not a copying ink, but may be rendered such by the addition of sugar or glycerine.