scale in this country, arraying those whom nature intended to be firm allies and inseparable friends into hostile camps in which the great law of love and mutual forbearance is extinguished by selfish passions. The law of force, whether expressed in trade associations, preventing other men from exercising their unalienable right to labor where they can find work, or in combinations of capitalists seeking by lock outs to close the avenues of labor, are equally reprehensible and should never be allowed, under any provocation whatever, to take the place of the divine law: 'Whatsoever ye would that men should do unto you, do ye even so unto them;' nor will such an unnatural and criminal substitution ever be possible, if poor men will remember that it is the duty and therefore the right, of every poor man to strive to become rich by honest, intelligent and patient labor, and if rich men will remember that the possession of wealth, which is the fruit of the general effort, confers no right to its use as an engine of oppression or coercion upon any class which is concerned in its production. Let me then record that, during a long life passed in active business, I have never known any but evil consequences to all classes, and especially to the innocent, to result from strikes, lock outs, or other forcible measures designed to interfere with the steady and regular march of productive industry, and I feel justified in an earnest appeal to both workmen and capitalists henceforth to regard each other as equals and friends; and to imitate the great example, so recently set by the enlightened governments of Great Britain and the United States, in the submission of their differences to arbitration; and not to expect to reform social evils by combinations designed to force either side into the acceptance of unpalatable terms, by the stern logic of starvation and indiscriminate ruin. Reform, to be of any permanent value, must be based upon personal virtue, not force; and it seems to me that the millenium will not be far off, when each individual shall set about reforming himself rather than society, and conforming his life to the great law of loving God and his fellow-men. While I thank you, my young friends—I had almost said my children—for this manifestation of your respect and gratitude, so touching because so full of love, let me ask you to accept of this feeble but heartfelt reply as a kind of last will and testament of the garnered experience of an old friend, whose days are almost numbered, and who asks only to be remembered as "one who loved his fellow men."

KLINKERFUES' APPARATUS FOR IGNITING GAS AND OTHER LIGHTS.

This new apparatus, devised by Professor William Klinkerfues, of the University of Göttingen, was very briefly noticed in our last issue. It has, however, so many points of scientific interest, especially bearing upon the mysterious phenomenon known as catalysis, that we this week give a full account of the invention, as well as the principles upon which it is based.

The invention consists in the arrangement of a vessel containing a liquid, which, when brought in contact with a pair of galvanic plates suspended within said vessel, will close an electric circle and produce a current, whereby a piece or pieces of platinum wire, held in electrodes that connect with the said galvanic plates, will be excited to produce catalytic action and ignite combustible matter with which they may brought in contact.

The catalytic effects of platinum in its spongy, pulverous, or porous state have been frequently proposed as a means of lighting gas and other flames; but, if the short-lived success of the Doebereiner apparatus be excepted, no practical results have as yet been attained.

In these peculiar forms platinum is too liable to change to admit of the long and frequent use required by the exigencies of domestic applications, at least in any of the manners hitherto proposed. Nor does, in fact, spongy platinum, freshly prepared, ignite common illuminating gas.

These considerations lead naturally to the idea of employing more durable forms of platinum, such as wire or plate, and producing the same catalytic power by means that will not be subject to new objections. Still, there do not, thus far, seem to have been any proposals or experiments brought forward in this direction.

The experiments undertaken by Herr Klinkerfues for the purpose of ascertaining the temperature at which compact platinum, brought into the shape of wire or plate, acquires sufficient catalytic power to ignite illuminating gas, showed that not even a red heat was required. A platinum wire inserted between the poles of a very small galvanic pair of zinc and graphite, without showing the slightest emission of light in the dark, ignited a jet of glass almost instantaneously. It is evident, in this case, as the red heat of the wire is only an effect of catalytic action, that the galvanic circle is acting in a very different manner from the former methods, which effect ignition by the direct action of the electric spark.

This circumstance and the hydraulic closing of the galvanic circle are the principal characteristics of the new contrivances, whose practical value has, it is asserted, been tested by numerous experiments; for if a stronger action of the galvanic current were required, the power of the battery would be exhausted in a far shorter time; and indeed it would be impossible to employ an apparatus of small interior resistance, such as zinc and graphite, with a solution of bichromate of potassa and sulphuric acid, or chloride of silver and zinc with a solution of salt, for months without renewing the filling. At the same time the hydrostatic manner of closing and breaking the galvanic circle affords the easiest and simplest means of instantly producing the desired catalytic action, and afterward stopping it again at will, for the sake of economizing the materials.

On this principle of imparting catalytic power to platinum in its compact forms, by means of the galvanic current, the inventor has had several kinds of gas lighting contrivances constructed, for which patents have been obtained through the Scientific American Patent Agency.

The first apparatus consists of a thin, hollow, glass cylinder, of suitable size, closed at the bottom, and covered by a plate, bearing on the inside a galvanic pair of zinc and graphite plates of small size.

These plates are respectively connected with electrodes that project from the outside of the plate, holding an inserted bit of platinum wire. The liquid filling consists preferably of the well known mixture of bichromate of potassa and diluted sulphuric acid, which will be active for a long time.

In order to light gas flames for domestic purposes with this simple apparatus it is only necessary to incline it sufficiently, and, at the same time, hold the platinum wire before the jet of the gas that escapes from the burner. But when the apparatus is placed upright, the plates not touching the liquid, no galvanic action takes place, and consequently no material is consumed by electric action, so that, it is claimed, a mixture of the value of a few cents suffices for many thousand repetitions of the operation.

When the mixture is comparatively fresh, the platinum wire becomes so far red hot as to ignite a paper match impregnated at one end with chlorate of potassa.

The second application of the same principle is intended to supply a kindling apparatus for rooms not furnished with gas.

Doebereiner's principle for the evolution of hydrogen gas is worked by the pressing down of a lever, which, at the same time, immerses a small galvanic pair of zinc and graphite plates in a mixture of bichromate of potassa and sulphuric acid, and thus excites catalytic power in a platinum exposed wire, to the hydrogen gas jet.

The working of Mr. Klinkerfues' apparatus is said to be very reliable, rendering it far preferable to Doebereiner's with platinum in the spongy form.

The third of the proposed contrivances is intended to be applied to street gas lights for the purpose of simultaneously lighting and extinguishing a number of lamps from a single station with the smallest possible loss of gas or other material.

Important reasons forbid that the shutting off the gas supply should be placed far back of the mouth of the burner, and make it necessary to devise some means for opening and cutting off the supply from a distance. At first sight the simplest way to effect this would seem to be by stop cocks, connected with electro-magnets, to be worked by galvanic action from a common station. But, in the first place, it would hardly be possible to guard against loss of gas and the entrance of atmospheric air into the pipes.

Another consideration presents itself in the fact that galvanic batteries intended for the production of caloric must be of weak resistance, and are, therefore, incompatible with great lengths of conducting wires, as well as long duration of galvanic action, if a frequent renovation of the filling is to be avoided. It is, therefore, proposed to furnish each lamp post with its own galvanic apparatus, and to make the galvanic pair touch the liquid only during the short time of lighting up.

An hermetically closed vessel is provided with a compartment or bell, open at the bottom, so as to communicate with the main vessel, and having a galvanic pair of zinc and graphite fixed to the cover in such a manner that the solution of bichromate of potassa with sulphuric acid, contained in the lower part of the vessel, is not reached by them when the apparatus is in its usual inactive state. A pipe leading to the burner of the gas flame, passes, air-proof, through the cover of this vessel, and is immersed in the liquid, thus shutting off the outward air from communication with the upper part.

The latter is filled, above the above named liquid, with illuminating gas supplied from the gas works, and as the pipe which passes through the cover is of sufficient length to hold the hydrostatic column raised by the small and nearly constant pressure usual in gas pipes, it takes the place of the last stop cock in the supply pipe.

By another pipe leading to the bell from a station at any required distance, the air in the upper part of the bell can be rarefied, and thus the liquid in the hermetically closed vessel can be sucked up, lowering the surface so that the escape of the gas through the pipe leading to the burner is first opened, and then, on continued suction, the zinc and graphite plates are reached by the liquid.

At this point the galvanic circle is closed, and the platinum wire over the mouth of the pipe leading to the burner becomes heated, and acquires sufficient catalytic power to kindle to a flame the hydrogen contained in the gas jet.

After this is effected, a slight remission of the sucking power in the pipe is made to sink the level below the galvanic plates in order to avoid unnecessary exposure, but without shutting off the escape of the gas.

In order to make sure of this effect on all the lamps a model apparatus must be placed at the station, corresponding in all respects to those of the lamps.

The putting out of the light is effected by opening the sucking pipe to the access of atmospheric air, thus restoring the previous state of equilibrium, and, at the same time, preventing differences of temperature in different parts of the sucking pipes to cause partial suckings, and thus stop the correspondence in the working of the apparatus on the different lamps.

This apparatus may be attached to any ordinary gas pipe, and is easily removed, when required, for the purpose of a revision.

To guard against interruption in the hydraulic connection of the galvanic circle by the effect of low winter temperature, in either freezing the water of the filling or causing the bichromate of potassa to be crystallized from the solution, it is necessary to employ, during the winter months, a solution containing a greater quantity of sulphuric acid and less of the chromate, a mixture that practically is best prepared on cold winter days.

Let in the Sunlight.

Mrs. Henry Ward Beecher, in an article in the *Christian Union*, on mistakes in our houses, specifies the "exclusion of sunlight" as one. She says:

We wish the importance of admitting the light of the sun, freely, as well as building these early and late fires, could be properly impressed upon our housekeepers. No article of furniture should ever be brought to our homes too good or too delicate for the sun to see all day long. His presence should never be excluded, except when so bright as to be uncomfortable to the eyes. And walks should be in bright sunlight, so that the eyes are protected by veil or parasol, when inconveniently intense. A sun bath is of far more importance in preserving a healthful condition of the body than is generally understood. A sun bath costs nothing, and that is a misfortune, for people are deluded with the idea that those things only can be good or useful which cost money. But remember that pure water, fresh air, sunlight, and homes kept free from dampness, will secure you from many heavy bills of the doctors, and give you health and vigor, which no money can procure. It is a well established fact that people who live much in the sun are usually stronger and more healthy than those whose occupations deprive them of sunlight.

Silver Ores from Utah Territory.

It is proposed to erect in Pittsburgh, smelting works of sufficient magnitude to reduce the silver ores from the West, and so save the heavy transportation charges to and from England or Germany, in which countries the ores are chiefly at present smelted. A project of this kind is not likely to lack encouragement from the Pittsburgh capitalists, and the operation is expected to commence in the present month. Thus will be added another important manufacture, and a new source of prosperity, to the varied and important industries of Pittsburgh.

Mr. R. J. Anderson recently brought to Pittsburgh, some specimens of silver ore, which had been taken from the earth under his personal supervision. The yield of silver from the mines in question has been as high as eight hundred dollars per tun of ore; besides a very large percentage of lead, enough, indeed, to pay all the expenses of mining, freight to Pittsburgh, and the cost of smelting.

How to Banish Fleas.

The *Maryland Farmer*, a most excellent monthly, published in Baltimore, gives the following useful recipe for exterminating fleas:

"The oil of pennyroyal will certainly drive these pests off; but a cheaper method, where the herb flourishes, is to throw your dogs and cats into a decoction of it once a week. Mow the herb and scatter it in the beds of the pigs once a month. Where the herb cannot be got, the oil may be procured. In this case, saturate strings with it and tie them around the necks of dogs and cats, pour a little on the back and about the ears of hogs, which you can do while they are feeding without touching them. By repeating these applications every twelve or fifteen days, the fleas will flee from your quadrupeds, to their relief and improvement, and your relief and comfort in the house.

Strings saturated with the oil of pennyroyal and tied around the neck and tail of horses will drive off lice; the strings should be saturated once a day.

An Useful Invention on Shipboard.

Not long ago there was seen on board the timber laden ship *Henry Woolley*, lying in the Victoria Dock, Leith, a useful but unusual piece of machinery, so far as ships are concerned. The vessel was making water, and to save the crew the heavy labor of pumping her, a windmill, with simple machinery was connected with the pumps. When the wind was blowing high, recently, the mill was revolving with great velocity, and doing the work well. Such an appliance was lately adopted with marked advantage on board an Aberdeen guano laden vessel, which sprung a leak when she was a month out at sea, on her voyage from Callao to Leith. A handy carpenter, who was on board, set to work at the suggestion of the captain, and rigged up a windmill which relieved the crew of their extra work, and enabled the crew and the ship to arrive safe in port. The use of the windmill for pumping barges is very common in this country. They are employed on most of the North River ice barges that ply between this city and the up country ice establishments.

TERRA COTTA IN GEORGIA.—A correspondent informs us that terra cotta of the finest quality is found near Atlanta, Ga., and is now being worked into drain pipes, chimney tops, building ornaments, flower vases, garden statuary, fountains, etc.

WE are glad to hear of the recovery and repair of one of the Anglo-Atlantic telegraph cables. The British steamer *Scanderia* is now fishing for the second cable, and we shall probably soon announce its restoration to efficiency.

THE use of torpedoes for killing fish for manure, on the coast of Florida, has driven the shoals of fish from the shore, and has naturally been resented by the inhabitants of the seaboard of that State.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged.

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.—MOUNTING CHROMOS.—I wish to mount some chromos and engravings on canvas for framing. Should the canvas be dampened before being tacked on to the frame? If it should, then must the picture be dampened also, and applied to the canvas before the latter is dry? Or must the canvas be perfectly smooth before the picture is pasted on to it? Does the canvas require to be sized with anything? What kind of paste is best? and should it be spread upon the canvas or the picture? I would like full instructions for doing the work.—T. E. C.

2.—TURNING METALS.—Will some one give, from practical experiments, the proper speed for the surface in turning brass, copper, annealed cast iron, cast iron unannealed, wrought iron, malleable cast iron, annealed cast steel, cast steel unannealed, cast steel tempered to a blue, and chilled cast iron rolls? A. H. G.

3.—ROACHES.—Is there any sure poison for roaches, that may be used without danger to children or domestic animals?

4.—PIGMENT FOR GLASS.—I wish a pigment for glass, something similar to collodion used by photographers, that will dry quick and hard, and that will not peel off in water. If possible, something that can be put on with a brush and stencil plate.

5.—CISTERNS AND CHIMNEYS.—What should be put into a cistern of rain water to keep it pure and fit to drink when necessary? What will prevent chimneys emitting a sooty odor? Will sweeping obviate it?—E. E. H.

6.—GRADING DITCH.—I intend making a fish pond, and for the purpose have to tap the river several hundred yards above. Will some one advise me how to grade the ditch?—O. C. H.

7.—GUN BARREL.—Will any one tell me how to prove a gun barrel to be London fine twist?—H. B.

8.—SOUR WELL WATER.—Can any of your readers tell me the cause of sourness in well water? The well is removed from drains and impurities, but in the spring it has an acid taste resembling tartaric acid. At all times it is very hard, and will turn tea very black, more like black dye than tea; it will make white cloth turn yellow, if left in a few hours. The upper soil is sand, and the bottom of the well is quicksand. Is the acid hurtful, and what will correct it?—H. B.

9.—CIRCULAR SAW—Which will run the easiest (*i.e.*, with the least power), an eight inch circular saw one eighth of an inch thick, and sixty teeth, or one, one sixteenth of an inch thick, and thirty teeth?—E. A. M.

10.—DISSOLVING RUBBER.—I should be glad to find out, through your columns, how I can dissolve india rubber, so as to make it form a component part of a printer's roller composition, and what is the best kind of rubber to use. I have tried rubber in wood naphtha, and failed.—P. E. M.

11.—STAINED CLOTHING.—How can I remove the stain of tincture of iron and quinine from clothing?—J. J. W.

12.—FIREPROOF WHITEWASH.—Wanted—a whitewash for inside of covered railroad bridge, to render timbers spark proof?—A.

13.—CHEAP BATTERY.—I tried A. G.'s directions to make a cheap battery. I first procured a gallon stone jar, and placed a cylinder of sheet zinc in it. I then took a flower pot, and placed a cylinder of sheet lead in it, and filled it with a solution of sulphate of copper, and the outside with a solution of common salt. I then put brass wires through holes in the lead and zinc; at first it did not work, so I cleaned my zinc with sulphuric acid, and tried again. It worked at first, so that it made an electro-magnet slightly magnetic, but the next day it would not do that. I finally concluded to take it to pieces. I evaporated the solution of blue vitriol, and expected it to crystallize, but it did not. On straightening the lead, I found it covered with copper about one thirty-second of an inch in thickness, which was so brittle that it broke very easily, and would not soften when I heated it, and put it in water. Will A. G. explain?—G. M. A.

14.—RESTORING STEEL.—Will some of your correspondents give me the recipe for renewing steel, after it has been burned or heated too hot in working?—A. T. L.

15.—SOLDERING OLD WARE.—Can some one of your correspondents tell me how to make an acid to solder old tinware, copper, etc.? Being a tinner, I find out that something that will not eat the tinning of the iron is more desirable than the old style of zinc and muriatic acid, as every time there is any old greasy thing brought to the shop, acid must be used; and just as sure as it is, you must tin the iron as soon as it is done. Something that won't have any effect on the iron would be better to use.—L. E. A.

NEW BOOKS AND PUBLICATIONS.

HIT. By Mary E. Walker, M.D. New York: American News Company.

This book is a remarkable proof of the dispersive power of the writer's mind. Probably never before was so little matter dilated into an average sized book. While containing nothing that is calculated to disturb our habits of thought, and little that will induce us to exercise the powers of memory, which are, like other mental faculties, much overtaxed in these days, there is a simplicity in the manner in which the trite sentences are repeated, which is innocence itself; and the utter absence of any pedantic elaboration or references to recondite authors, either for facts or illustrations, hightens our idea of the writer's *naivete*. The only remarkably original thing in the book is a statement that the Orleans dynasty was expelled from France in consequence of the death of the Duke of Orleans. It is generally believed that the revolution of 1848 was created by the obstinacy of Louis Philippe, which was so great that the popularity of his wife, sons, and daughters could not save him from public indignation; but we do not desire to lay ourselves open to a charge of ungallantry, and so will not insist upon accuracy

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.

H. F., of Md.—The following, relative to the invention of the link motion, from Auchincloss' work on "Link and Valve Motion," answers your queries: "The first form was invented by Mr. Howe, in 1843, and applied to the locomotives of Messrs. Robert Stephenson & Co. It is, in fact, the representative link motion, which, excepting slight modifications in the mode of suspension, remains unchanged by the accumulated experience of a quarter of a century. Simultaneous with the appearance of this motion was that of the second, the discovery of Mr. Daniel Gooch. It accomplishes perfectly analogous results, and has met with much favor throughout Great Britain and the Continent. The 'Allan' combines the characteristic features of the Howe and Gooch link motions in such a manner that the parts are more perfectly balanced, consequently it dispenses with the counter weight or spring peculiar to the former of these motions. The Walschaërt motion is extensively applied in Belgium, but probably will not receive much attention from locomotive engineers, beyond the limits of that kingdom, unless future designers succeed in reducing the number of its connections."

LIQUID GLUE.—Fill a vessel (I use a glass jar) with broken-up glue of best quality, then fill it with acetic acid. Keep it in hot water for a few hours, until the glue is all melted, and you will have an excellent glue always ready.—F. W. S.

MILLSTONE DRESS.—If J. A. P. will put fourteen quarter dress, four inches draft, with three short furrows intersecting the leading ones in his buhrs (supposing them to be of medium porosity), and crack the face parallel with the furrow, say after every five or six hundred bushels are ground, keeping the furrows deep at the eye, with same width of furrow (not allowing the stones to run empty), running the stone from one hundred and sixty to one hundred and eighty revolutions per minute, he will find his mill will grind faster, cooler, and make better flour. The trouble is, he has not leading furrows enough in his nine quarter dress, and the short furrows cross each other at too great an angle. J. A. Mc., of Ind.

POUNDING OF PISTON.—Steam is elastic, and consequently an excellent spring or cushion for a steam cylinder, between the piston and cylinder head. Adjust your eccentric so that enough steam will enter the cylinder to cause a gentle pressure to reach the wrist pin as the latter arrives at the center or dead point. Thus the steam begins to impart its power at the first opportunity, without any concussion or pounding in any of the connecting joints. Although some of the connecting joints may be a little loose, yet the lead may be so nicely adjusted that the wrist pin will pass the centers without any concussion, pounding or jarring, provided the governor works right, and the steam is dry.—W. W. C.

HOROSCOPE.—E. T., in query No. 13, June 10, asks the mean of tracing the horoscope. The horoscope of the astrologers was the aspect of the heavens at any particular time, and was consulted by those wise men to obtain knowledge of the future weal or woe of the person or undertaking then under consideration. Thus, the position of the stars at the time of the birth of a child was its horoscope, and believers in the obscure science discovered all sorts of destinies for the infant, by inspecting the firmament. The science (?) of astrology is very ancient, and its existence can be traced in the writings of the Chaldeans. It is perhaps the only quackery, ancient or modern, that has had a systematic and consistent plan. I trust that no readers of the SCIENTIFIC AMERICAN are believers in such an imposture.—D.B, of N.Y.

FIXING LEAD PENCIL MARKS ON PAPER.—Let J. H. R. stretch his drawing tightly on a board, with drawing pins, and pour a little pure milk (if he can get it) on the paper, turning the board about till the milk has flowed all over the drawing. The turning must be done at once as the milk must not be allowed to rest on the paper. When the whole surface is wetted, let the milk drain off, and leave the board with the drawing in the air to dry.—D.B., of N.Y.

COPYING INK.—A. S. can make copying ink by dissolving powdered refined sugar in ordinary ink. He should use just enough sugar to make the writing look slightly glossy when dry.—D.B., of N.Y.

CLOTH ROLLERS.—R. A. D. will find that rollers covered with coarse emery will answer his purpose. Put a thick coat of glue on the roller, while it revolves slowly; then sift on the emery, let it dry, and then put on more glue; keep it revolving until dry, and then put it in the loom. O. K., of Miss.

NOISY GEARS.—I would advise S. R. to grease his noisy cogs with tallow every morning, and, if they are properly geared, it will prevent the noise.—S. N., of Ohio.

BOILS.—I advise W. E. to drink tea made from the root or leaves of the burdock, a pint or so a day for several weeks, which will cleanse and purify his blood, and prevent boils.—S. N., of Ohio.

J. C. F., of Pa.—Your plan of propelling wheels by tidal flow into and out of rivers, estuaries, etc., has been employed in all its essential particulars, with success, in Europe and India. We think it has also been used to some extent in this country.

J. H. P., of N. Y.—It is not unusual for concentrated maple syrup to deposit crystals like the specimen sent. There is no difficulty in making a perfectly white loaf sugar from maple sap by proper purification and draining. For purification, the process employed for refining the ordinary cane sugar would be appropriate.

J. H. S., of Pa.—All else being equal, it will take more power to drive a large shaft than a small one, principally on account of increased friction.

C. H. R., of N. Y.—You will find answers to your queries, if you follow with care what we have published and are now publishing on the subject of Canal Boat Propulsion.

T. D. L.—Your proposition for the propulsion of boats by forcing water through a longitudinal channel, with a pump or screw, is an old device.

W. B. W., of N. Y.—Your query is answered on page 209, current volume.

R. M. S., of Ill.—We know of no book specially devoted to the manufacture of grape sugar from starch. You will find the necessary information in various works on chemistry and chemical manufactures under the subject of sugars.

W. G R., of Mass.—The term "hydraulic lime" means the same thing as "meager lime," "water lime," "water cement," etc., comprising the cements sold in market for hydraulic purposes. These cements are made from limestones, containing in various proportions, alumina silicate of alumina, carbonate of magnesia, or oxide of iron.

G. S. C., of Texas.—The mineral you send is lignite of the tertiary age, but the specimens show an inferior quality. Still it may be of value in your section, if the bed be extensive, easily accessible, and near to market. But it would never compete with bituminous coal.

J. P. G., of Me.—The minerals you send are not apatite (phosphate of lime) but appear to be silicate of alumina.

J. W. M., of West Va.—The substance is comminuted quartz, and, no doubt, if it can be obtained of uniform quality, may be useful as a polish for certain purposes.