Correspondence.

High Science Gunnery.

To the Editor of the Scientific American:

Long range guns are so rapidly being developed that the rotundity of the earth is offering a serious impediment to correct artillery practice, as a target placed at the extreme limit of the range is necessarily below the horizon. A gun, therefore, whose range is fifteen miles is supposed to be the most perfect instrument of war that can be devised. This is an error. Let us continue in enlargement until we obtain a gun whose range is 12,000 miles. It could be mounted like the Lick telescope, with equatorial mountings, and be loaded and aimed by a corps of competent astronomers. Suppose we were involved in a controversy with Germany over the libels which that nation has published on the American hog. Our ultimatum having been sent and war declared, the astronomers, knowing the longitude and latitude of Berlin, could accurately train the gun; the mathematical corps compute the number of grains of powder necessary to impel the projectile; the engineer corps time the fuse with accuracy, and work out the trajectory; and the electrical corps fire the several cubic miles of powder at the precise moment appointed by the Secretary of War for hostilities to begin. The missile would clear all friendly and neutral nations, land immediately in the center of the doomed city, and insure peace by leaving no German alive. There are some few mechanical difficulties yet to be overcome before this gun can be properly constructed, but I believe it will yet prove to be the gun of our national armament. H. G. C.

Treatment of Stammering.

To the Editor of the Scientific American:

The treatment of stammering given by your North Carolina correspondent, in your issue of Jan. 9, needs modification, inasmuch as it will not have the same effect in the majority of cases as in his own. A person may stammer with a full lung as well as with an empty one, and for the former to increase the quantity of air already inhaled would augment his difficulty. After many years of personal experience and the observation of scores of stammerers, I confidently assert that the quantity of air, be it large or small, in the lungs has little or nothing to do primarily with this affection. Using familiar terms, my theory is that stammering is an abnormal action of the laryngeal valves. The latest physiological authority shows that the larynx—the voice box—has two valves, namely, the one formed by the true vocal chords and the one formed by the false vocal chords, the closure of the former preventing the ingress of air, and the closure of the latter preventing the egress of air. Now, stammering is a conflict between or an antagonism of these two valves—all of the contortions, shortness of breath, and various other manifestations resulting therefrom. The only rational and effectual treatment of this speech defect, therefore, is to establish a harmonious action between these two valvular processes, together with correct diaphragmatic activity, whereby the proper tension of air takes place in the lungs, and the column of air reaching to and playing upon the vocal chords is rightly supported, and the super-laryngeal parts left free to mould, modulate, and articulate the voice which has been produced at the vocal chords.

EDGAR S. WERNER, *Editor of The Voice.*
48 University Place, New York.

Zinc Chloride.—A Useful Suggestion.

To the Editor of the Scientific American:

I have read with considerable interest the report of the committee of the American Society of Civil Engineers on the preservation of timber, as printed in your SUPPLEMENT.

The conclusions arrived at have led me to write you in relation to the source of a cheap supply of zinc chloride, which I think is worth the attention of railroad men.

In Colorado, and other parts of the mining regions of the Rocky Mountains, many of the silver mines carry so high a percentage of zinc blende as to impair the value of the ores for silver. Such ores are discounted by the ore buyer or smelter according to the amount of zinc they contain, as its presence renders the ore difficult of fusion, and causes also a loss of silver by volatilization.

The whole of this zinc could be saved as chloride, with great advantage to the smelter, by calcining it with common salt.

Many of these ores carry from 30 to 50 per cent of zinc blende, and by treating them with salt for the formation of chloride, and then leaching it out, the bulk to be smelted would be proportionately reduced, and a saving of labor or fuel greater than the cost of the operation would result.

The chloride of zinc would have a market value, if burnettizing the ties becomes general, and the miner of such ores would not be at a disadvantage from the presence of zinc in the ore.

But a small addition to the smelter's plant would be necessary, and such works as the Argo and Grants, at Denver, and the works at Pueblo, could furnish enough chloride to treat the ties of many thousands of miles of road.

It is true that some silver would be leached out with the zinc, but that can easily be recovered by the addition of metallic zinc, in proportion to the silver in the vat. The addition of vats and pans for concentrating the zinc chloride would not be a great cost, and all the smelters have the necessary calcining furnaces. Give a market for the chloride, and the thing is done.

Another point deserves consideration; that is, after impregnating the timber with the solution, I would suggest the dipping in a solution of silicate of soda, which would form a silicate of zinc in the outer pores of the wood, and preserve them from the action of rain and moisture.

The regions of the mines supply a large portion of the ties, and from careful calculations I am led to believe that the ties could be prepared in Colorado and delivered to the railroads at a cost much less than in any other part of the country.

If this short notice attracts the attention of railroad men, the purpose is answered.

WM. WEST,
Sup't of Western Chemical Works, Denver, Col.

Waste in the Larder.

There is a useful article on this subject in the *Exchange and Mart*, from the pen of Miss J. Ascham.

A housewife's duty is to prevent waste. She must therefore know what is likely to go to waste and why, or perhaps she will do just what is wanted to spoil things which would have kept a little longer if they had been left alone. Most things in the larder are perishable, but not all alike.

Meat will keep three weeks in dry, frosty weather, and more than a week in cold dry weather, but not one week in damp, and hardly a day in very hot weather. If it has been frozen, it must lie in a rather warm place three or four hours before it is cooked. Meat should be taken down from the hooks every day, well looked over and wiped dry, and the hooks scalded and dried before the meat is put up again. Do not flour it. In very hot weather it is sometimes necessary to rub salt over the outside of a joint which is not to be cooked that day; but putting into a pan of treacle is much better, only it requires care, so as not to leave bits of fat, etc., in the pan when you take out the meat, and plenty of cold water to wash off what sticks to the joint when it comes out. It must, however, be carefully looked over when it comes from the butcher, and any doubtful bits pared off and burnt. If meat shows signs of "turning," it must at once be put into a very hot oven for half an hour, so as to be partly cooked. If it has really spoilt, nothing will save it, because the inside of the joint is then bad; but if it is browned, not just scorched, in time, the inside will be found perfectly nice. Of course, in a doubtful case, it may all be sliced up and fried; but then, as a joint, it is spoilt.

The dripping from a half spoilt joint is useless for food, and the bone will certainly spoil soup. Some cooks will plunge the meat into boiling water to save it, but this additional wetting is much more likely to hasten the catastrophe. In hot weather every bone must be baked, whether it is to make stock that day or not. Soup is just as good from baked bones as from raw ones. Every bone that has been boiled must be placed in a sharp heat and quite dried, and "scraps" which would help to make stock must be burnt if the cook has no time or room to make it. For one little bone is enough to spoil all the milk and cream, and will cause all perishable things in the larder to be just ready to decay.

The microscope helps us to understand the amazing rapidity with which germs multiply and diffuse themselves, but no one is yet able to say where their venom stops; probably they do harm to the entire house at the least. If bones are thoroughly dried, they will do no harm. All fat and suet should be cooked as soon as possible after it comes into the house; it should be wiped, sliced thin, and boiled for two or three hours, then strained, and the skin, which seems like leather, burnt in the middle of a hot fire. As soon as the fat is hard, it should be removed from the gravy, soup, or stock, wiped dry, and folded in thin paper. In very hot weather, sometimes it will not cake. Then a plate must be spared for it. The superfluous fat from a joint reduced to mince should be treated in the same way.

Fish must be cooked as soon as possible after it is caught. If, however, there is more than can be eaten in one day, the superfluous part should be boiled for five minutes, even if it is to be fried afterward—it can be dried; but nearly all fish is very nice stewed like eels, with the same sauce, and parboiled fish is as good this way as if it were quite fresh.

It is said that Condy's fluid will perfectly cleanse meat or fish just beginning to taint on the outside. I think this is true; but prevention is much better than cure. Never allow any meat or fish to lie if you can hang it up.

Game and poultry should be drawn, but not plucked or skinned, dried inside, and hung head upward.

Milk is the most troublesome article in the larder, and really wants a little safe to itself. It "takes up" the slightest suspicion of taint, and becomes most objectionable without turning sour. City people, at any rate, should boil the milk as soon as it comes in, from April to December. Then it should be strained into a clean flat pan, which must be scalded and rinsed with, first, a little soda, and then clean water, every time it is used. It is a help to mistress and maid to have two pans—one brown, one white—to use on alternate days, so as to insure time for purification. Country milk a little sour may be used for a pudding, or to make scones (one-half pint to one pound of oatmeal or brown meal, into which you have mixed one-fourth ounce carbonate of soda); but the milk which has been rattled about from 2 A. M. to 8 or 9 generally seems good for nothing when stale. In case of serious illness in hot weather, or whether a young child's nourishment is in question, ice is necessary. In default of "professional" apparatus, tie up as much ice as half a yard of flannel will hold, pass a stout lath through the string, and lay it across a metal tub; oval is more convenient than round. The ice will hang down and drip in the middle of the tub, and jugs of milk, bottles of soda water, or anything else will stand at the ends. Cover the tub, stick and all, with a thick board, and that with a damp, almost wet cloth. The milk may be boiled first, but must, of course, be cold before it is put with the ice. A damp cloth, without ice, keeps things much cooler than they are when uncovered.

Cheese, uncut, only needs to be kept dry. After it is cut, it should be wrapped in a buttered paper scraped almost dry. Butter may be rendered less troublesome in summer by being covered with a huge flower pot large enough to inclose the plate and rest in a tray in which there is some cold water. Leaving butter in water spoils it. Bread should be covered closely from the air. The pans want wiping once or twice a week, and then heating very hot; the bread must not be put in again until the pan is cold, nor warm bread ever covered up. Baker's bread often acquires a most disagreeable smell and taste if these precautions are neglected.

All vegetables, when cut, may be kept fresh by putting the stalks into water. Servants generally insist on immersing them, which favors decomposition. Parsley in particular can seldom be guarded from a watery grave. Carrots, turnips, and the like, if placed in layers in a box of sand, will keep for many weeks, I believe months. Clean new laid eggs will keep quite fresh for months if buried in dried salt well closed. Boiled potatoes ought to be laid out on a plate, and are then as good for frying or mashing as if they were freshly cooked. Servants have an unaccountable fancy for throwing them away, or, if desired to fry them, chopping and mashing them first, which entirely spoils them. If left heaped up, they will often spoil in one night, and must be burnt. No vegetables should be put into soup until the day that it is to be used. If any soup, complete, is left, it must be sharply boiled the next morning, and put into a fresh, clean pan. The gray earthenware jars made for salt are most valuable for such purposes and for keeping viands hot or stewing things. Chopped spinach can be warmed in one of them, and, as it takes time to prepare, may be boiled, etc., the day before, and thus served in perfection at the early dinner or luncheon. Cabbage, French beans, and vegetable marrows are better dressed as salad if they have cooled, and in hot weather are almost as treacherous for keeping as shellfish.

Fruits, like vegetables, will keep very fresh if you can manage to put the stalk into water, only it must not be in a close or dark place. When apples, oranges, pears, lemons, etc., are to be stored, they must not touch each other, and must be protected from heat, cold, and damp as much as possible; sunshine is not desirable. It would be easy, if an amateur carpenter was at hand, to make a frame of laths, like a Venetian blind, which would contain a very large quantity of such fruit, and take up hardly any room. Flour and meal, sago, macaroni, semolina, and all like substances, are sometimes attacked by mites. They are so small as to be invisible singly, but a peculiar fine powder is be seen at the top of the farina, and is not motionless. There is also a smell something like honey or fermentation. I think they never appear in a dry storeroom, though they are sometimes brought from the grocer's. The only thing to be done is to burn the infected store, and heat the jar almost red hot before using it again.

THE electric tramway on the promenade at Blackpool, Eng., is now in full working order, and cars driven by electricity run daily. A statement of the cost of laying the line by the Corporation has been issued. The line is 2 miles 1,000 yards in length, and the actual sum expended was $55,000. The cost of laying the central channel for the electrical apparatus was borne by the company which works the line.

Keep the Boiler Clean.

The cleaning out of kitchen boilers is too often neglected. All sediment cocks should be left open at least once a week for the space of fifteen minutes, so as to clean and wash out all foul sediment. Oftentimes, when complaint is made that the water smells, or that

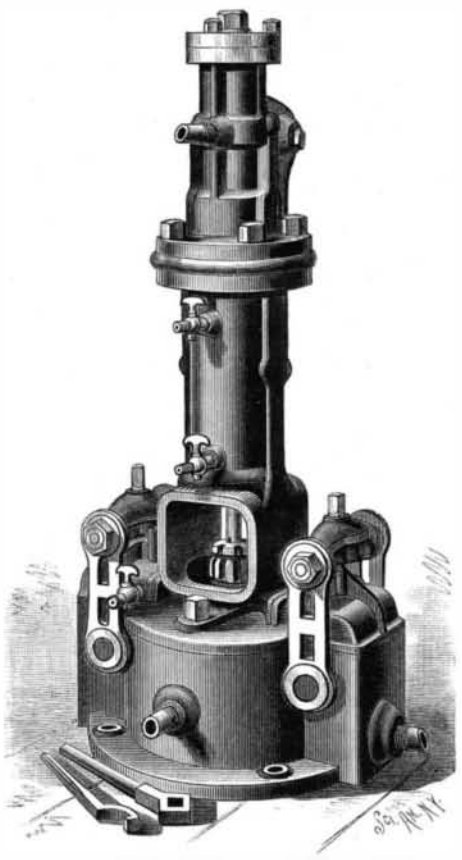


Fig. 1.—THE EMPIRE STEAM PUMP.

it don't heat properly, the real cause will be found to arise from this neglect alone. In fact, people seem to go on the plan that once in order, always in order. All plumbing fixtures, says an old plumber, require cleaning and looking after, just as the plate we eat off of.

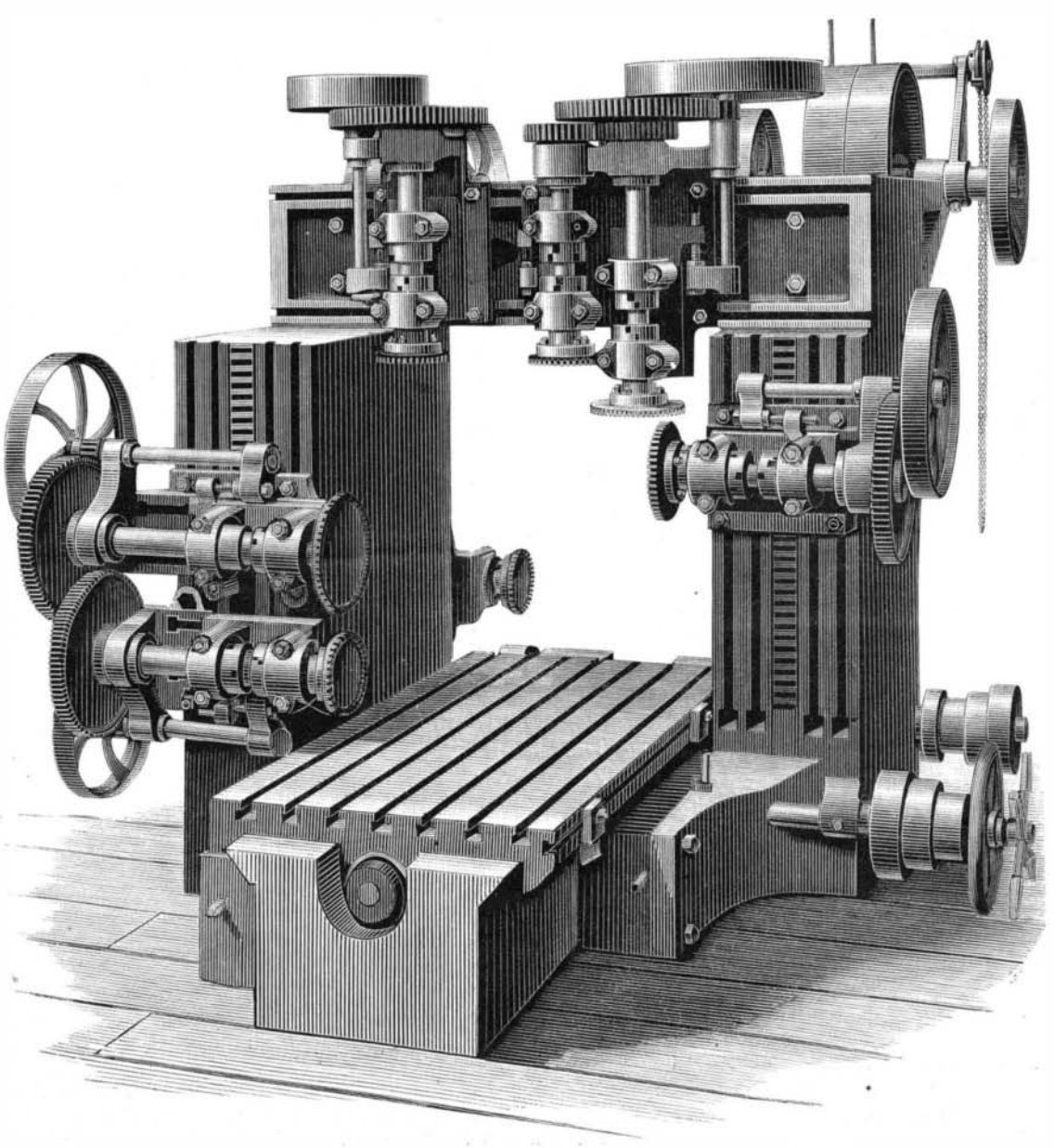
IMPROVED MILLING MACHINE.

The machine here illustrated has been specially designed by Hetherington & Co., of Manchester, for facing the various bosses and seatings on mule headstocks at one operation and at one setting, and is intended, says the *Engineer*, to supersede the old and costly method of planing. On the table of the machine is a strong chuck bracket—which is not shown in our illustration—so arranged that the mule headstock can be readily chucked into position, and supported while being operated upon. The machine itself, as will be seen from our engraving, consists of a strong bed, with table sliding upon it; attached to the bed on either side are massive double-faced uprights, carrying on the top a strong cross beam.

Mounted on the face of the uprights and cross beam are powerfully geared cutter heads, each having an independent compound movement for the adjustment of the cutters, provision having been made that when the cutters have been finally adjusted the heads can be firmly bolted to uprights, thus insuring the utmost rigidity. The machine will admit 3 feet 6 inches between the uprights, and the table is 6 feet long, with a traverse of 4 feet 6 inches. There are in all seven cutters, six on the front side of the machine and one at the back, and these seven cutters operate upon the different facings of the mule headstock, finishing them all to standard sizes with once traveling through the machine.

The table is arranged with a variable feed and quick-return motion, controlled by a hand wheel at the side of the front upright. This wheel being turned in one direction engages the slow cutting feed, and turned in the opposite direction causes the table to run back quickly on the return, while the middle position disengages both motions, and thus brings the table to a standstill. On the front edge of the table are two stops, which act upon the end of a lever coupled with a clutch on the feed cone pulley, and so arranged that when the stops come in contact with the lever, the feed motion or quick return is at once disengaged. A cross handle is also provided, for moving the table by hand if necessary. All the motions are driven separately from a countershaft carried by two brackets bolted to the back of the uprights and provided with an adjustable strap-shifting apparatus. The headstocks on the uprights are driven by open belts, and those on the cross beam by half cross belts. This arrangement allows the headstocks to be moved in position, when necessary, by altering the length of belt.

As already stated, the special feature of this machine is the great saving of labor effected over the old system of planing; and as an illustration of this we may mention that whereas formerly three days were occupied in the planing of a mule headstock, the same result is, with the special milling machine we have described, obtained in two hours; in addition, the further advantage is secured that all the headstocks are in exact duplicate, while the machine requires no attention after it has been started, the stopping motion coming automatically into action when the table has made the required traverse.



SPECIAL MILLING MACHINE.

THE EMPIRE STEAM PUMP.

The accompanying engravings represent a vertical steam pump, the most prominent peculiarities of which are its automatic valve gear and quick return plunger, which moves down at a given speed, but returns much more quickly. Its steam valve is operated without the aid of tappets, compound levers, or metallic connections of any kind.

It neither strikes a blow nor operates suddenly upon the plunger. The piston cushions noiselessly upon steam at the end of each stroke, recedes gradually for an instant until the water valves close, and then completes its stroke; this cushioning upon the steam allows of the pump being driven at great speed without danger of hammering. There is no outside moving gear or delicate adjustment, the only visible moving part being a portion of the piston rod, and even this when necessary can be inclosed.

In the steam chest there are but two pieces—shown in Nos. 2, 3, and 4, of Fig. 2, No. 1 being a sectional elevation through the entire pump—a slide valve and a differential piston to move the valve, these constituting the whole valve gear. The steam piston and water plunger are cast in one piece of steel or composition, as shown in No. 2. The stuffing boxes and water valve seats are made of composition. The links and bolts

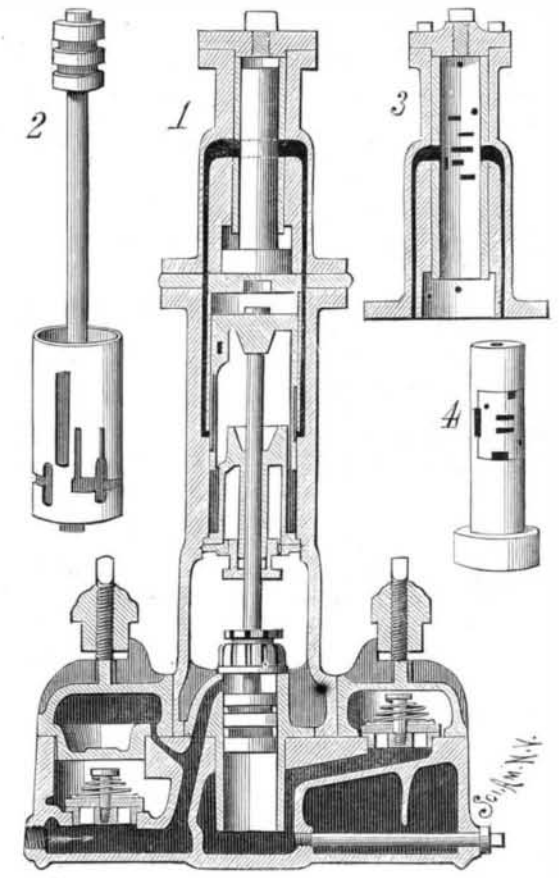


Fig. 2.—DETAILS OF THE EMPIRE STEAM PUMP.

holding the valve caps are steel, and all other bolts are casehardened. These caps can be easily and quickly removed, thus permitting access to the valves whenever necessary. Although having but two water valves, the pump possesses the same advantages, as respects a steady flow, as the ordinary double-acting pump, by reason of the quick return of the plunger and the creating of a partial vacuum on both the up and down stroke. The quick return movement of the piston prevents any vibration or quake, such as usually accompanies quick reciprocating motion. The pump being vertical, there is no wear to the cylinder or piston occasioned by the weight of the piston, and all foreign substances pass under or over the plunger, thereby preventing all abrasions or cutting, so destructive in many other styles of pumps. The arrangement of the parts is such that there can be no such thing as dead centers, and hence it can be run at one stroke per minute if desired. The pump is so made that the water cylinder may be changed, at a trifling cost, in accordance with the work to be done.

Any further particulars regarding these patents can be had by addressing the inventor, Mr. E. G. Shortt, of Carthage, N. Y. The pump is manufactured by the Empire Steam Pump Co., at whose office, 12 Cortlandt Street, this city, one may be seen in operation.

PASTEUR'S discoveries, according to the German press, were anticipated. It is pointed out that, on pages 213 and 467 of G. H. Jahr's "Clinical Directions," published in 1849 by H. Bethmann, Leipsic, under the headings of "Hydrophobia" and "Cases of Poisoning" mention is made of "inoculations with the virus of rabies" as a remedy against the bite of rabid dogs. "The physician who advocated and practically employed this remedy was a German, Constantin Hering by name, and resided in Philadelphia."