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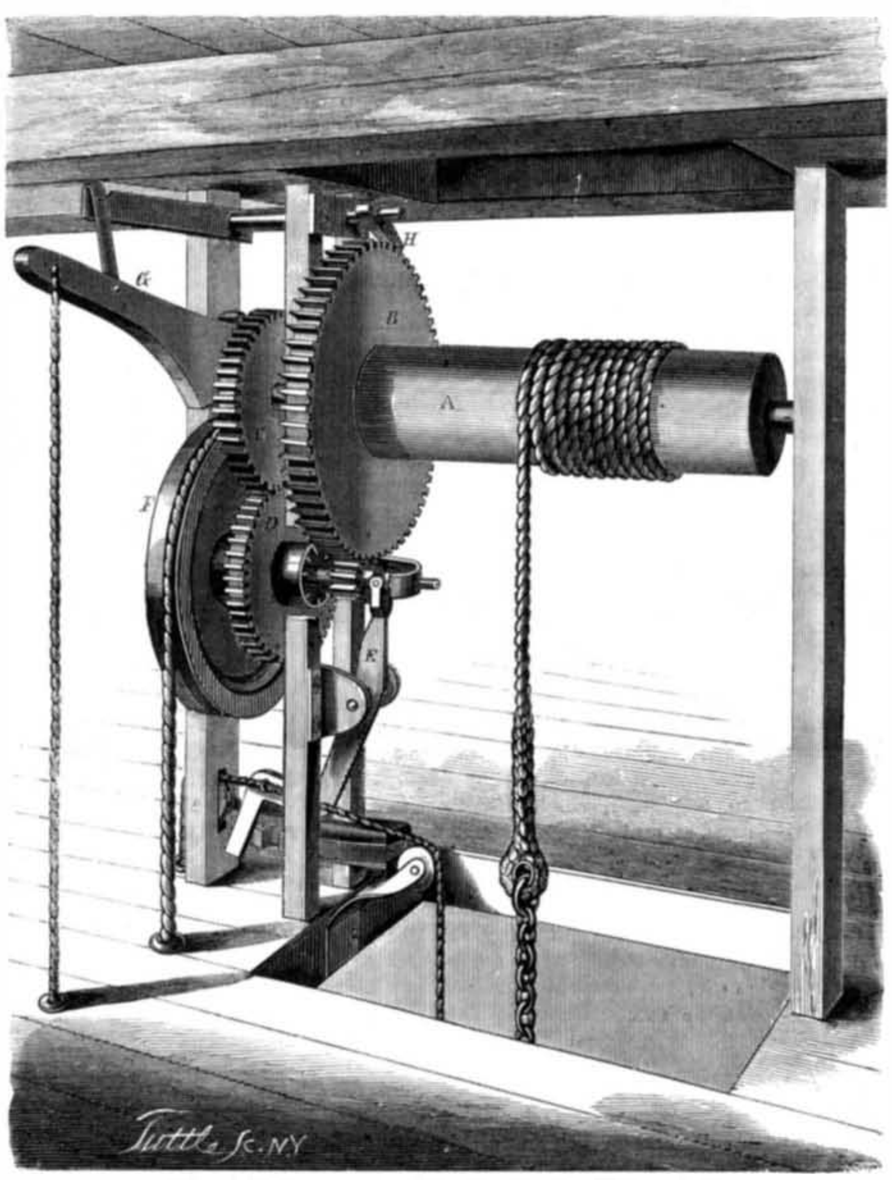
Hoisting Wheels for Warehouses, Etc.

The engraving represents the best hoisting wheel, we think, that has yet come under our observation. One of the annoyances of the ordinary hoist is that whatever the load to be raised, the speed is always the same, whereas a light load ought to be hoisted not only with less effort than a heavy weight but much more rapidly. This is what this hoisting apparatus does.

The beam, A, has secured to its shaft and moving with it, a large gear wheel, B, and a smaller gear wheel, C. This latter gears into the wheel, D, of the same number of teeth, which is loose on its shaft. Its hub is a gear with internal teeth, into which a pinion on the same shaft slides by means of the lever, E, working a clutch. The pinion is secured to the shaft by means of a feather and slot, as are ordinary clutches, so that while it can be slipped forward and back, in either position, its rotation secures the rotation of the shaft on which it works. It engages either with the large wheel, B, or with the smaller gear, D, according as the clutch is moved in one direction or another, or it may be held between the two, when the hoisting wheel, F, may be turned without moving any part of the machinery except the shaft on which it is fixed.

When, as in the engraving, the pinion gears with the large wheel, B, it is evident that by working the wheel, F, by the hoisting rope, an immense leverage is obtained and the speed of the barrel, A, will be slow. This is the position for raising heavy weights. But when the weight to be raised is light, the pinion is shipped into the hub of D and locks that wheel to the shaft. Now, if power is applied to the hoisting rope, the barrel, A, will turn as fast as the wheel, F, because the size of the gears on either shaft is the same. It will thus be seen that articles of light weight may be raised with great rapidity, while a shifting of the clutch will instantly throw the machinery into gear for heavy work. As will be seen. this shifting is readily managed from any floor by means of the lines attached to the lever, E. The edges of the teeth of the wheel, B, the pinion, and the internal gear of D are brought to a V-edge to insure locking whenever the pinion is shipped. G is a brake and unlocking lever, by means of which a load can be lowered. By pulling upon the line attached to it, the pawl, H, is lifted and the wheel, B, with the barrel, A, allowed to turn, while the velocity of their revolution may be regulated by the brake.

This hoisting apparatus has been in use for over seven years and has received the highest testimonials from those who have used it. It was patented by John McMurtry and is manufactured by S. H. Whitaker, 162 East Front street, Cincinnati, Ohio. For information relating to the invention, address John McMurtry, Lexington, Ky.



McMURTRY'S IMPROVED HOISTING WHEEL.

Improved Reamer.

The most expensive of the smaller tools used in machine shops is the reamer, and in a well managed shop no tools are so indispensable as a good set of standard sizes of reamers, enabling the workmen to keep a perfect uniformity of sizes of holes in the building of a number of machines of the same kind, and in various other uses where a similarity is required. Owing to this great expense, few shops are provided with them, although just as much time might be saved by their use as in the smaller ones.

The engravings represent an article of manufacture which, at a trifling expense, will enable all shops to provide themselves with any sizes necessary for their work. It is a reamer made entirely of cast iron, excepting the cutters and shank, which are of steel. The manner of making them is simply this:—The steel for the cutters is cut off the required length and made dovetailing as represented in Fig. 2, or as the ordinary dovetail, which can be done in rolling the steel in bars, where a large number are made, placed in the mold, as is the shank, and the iron is allowed to flow through the mold uniting the steel and iron so firmly together that it is impossible to separate them. They are then turned off to nearly the size required, hardened, and again placed on centers and ground off to the size required. These reamers can be made any size, shape, or number of cutters desired, at a trifling expense over the price of common castings. They answer ad mirably for taper reamers for reaming large steam, gas, or water cocks, or for boring pullies by machinery, etc. The cast iron gives a firmness to the cutter which can not be obtained by simply using a cutter for the purpose of boring. They have been in use in a number of shops, made in a variety of shapes for different work, always giving good satisfaction.

Fig. 1.

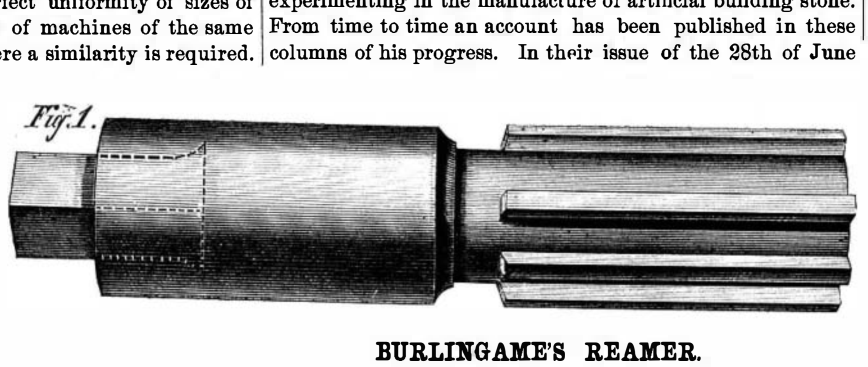
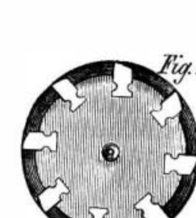


Fig. 2.



BURLINGAME'S REAMER.

This reamer was patented by W. Burlingame, Choate Mfg. Co., Exeter, N. H., through the Scientific American Patent Agency, Jan. 1, 1867. The patentee wishes to dispose of the entire right to manufacture them, and will furnish companies with samples at a reasonable price. State or shop rights for sale. For further information address as above.

ARTIFICIAL STONE FOR BUILDINGS.

For a number of years a Mr. Ransome of England has been experimenting in the manufacture of artificial building stone. From time to time an account has been published in these columns of his progress. In their issue of the 28th of June the *Engineering* gives the annexed interesting statement of the mode of manufacture, test of processes, etc. :—

If Mr. Ransome has not found the philosopher's stone, he has at least produced a stone worthy a philosopher, and which promises to become the stone of the ages. For it appears to have the elements of great durability, and it certainly possesses every other quality desirable in building stone, whether for structure or ornament. Although five years are not five centuries, chemistry has analyzed even the tooth of time, and can produce, within the period of a comparatively brief experiment, results identical with those of ages of atmospheric corrosion and disintegration. Mr. Ransome's stone has been boiled, and roasted, and frozen, and pickled in acids, and fumigated with foul gases, with no more effect than if it had been a boulder of granite or a chip of the blarney stone. It has been boiled and then immediately placed on ice, so as to freeze whatever water might have been absorbed, and it has been also roasted to redness, and then plunged in ice water, but without any sign of cracking or softening, superficially or otherwise. Nor does its durability rest alone upon such evidence as this, for it is of the simplest chemical composition; and chemistry and geology alike testify to the durability, if not the indestructibility, of a stone which is nearly all silica, like flint, and onyx, and agate, and jasper. It has no oxydizable constituent; for silica, or silicic acid, is already oxydized, and thus it is unalterable in air; and as the new stone is almost impermeable, it will suffer little, if any, injury from moisture or frost. We may, then, as the lawyers say, "admit" the durability—and if we insist upon further evidence, only posterity, say in the twentieth and twenty first centuries—can have the benefit of it, and no doubt Mr. Ransome will bequeath plenty of test blocks for their satisfaction—and the stone is everything else that can be desired of a building stone, or of a stone for external ornament, excepting, of course, that it does not polish.

And how marvellous, for its simplicity and beauty, is the process by which this stone is made! Some toiling mason or other, hewing in the quarry or in the builder's yard, must have wished, before now, that stone, like iron, might be melted, and run in molds, even though his own occupation were thus at an end. Did he ever, when by the sea shore or by a sand pit, think of cementing indissolubly together the countless millions of grains into solid rock? Mr. Ransome, no mason, however, unless he be, as he may be for any thing we know, a member of the mystic brotherhood, did think of this. And he tried every cement he could lay his hands to, and did not succeed. The sand became little else than mortar by such sticking as he could effect. But he found out, at last —and we are speaking of a time more than twenty years ago —that the best sandstones were held together by silicate of lime. And so he set himself to work to produce this substance, indirectly, from flints, of which plenty could be found for the purpose. But the flints had to be liquefied first, and how could this be done? Not by heat, nor would caustic soda touch them, so the chemists said. Flints might be boiled in a caustic solution for a week together, so long as the boiler was an open one, and lose very little by the operation. But by-and-by, Frederick Ransome made one of the most unexpected discoveries in chemistry, viz., that when boiled in a caustic solution, under pressure, flints would melt almost like tallow before the fire. But we are not about to give the long history of the invention. With flint soup, or silicate of soda as a liquid, the question was what other liquid would, in mixing with it, turn both into an enduring solid? What other liquid would turn both into silicate of lime—the substance he was seeking? When he found that chloride of calcium (in solution) would, when mixed with silicate of soda, turn both into flint, or something very much like it, the road was clear, and the manufacture of stone from sand was as simple and as beautiful a process as the making of Bessemer steel from pig iron by blowing air through it when in the melted state. Chloride of calcium had been chemically considered a very respectable married couple, known as Ca and Cl. There was a little bigamy attaching to silicate or soda, but the principal parties to the marriage were silicium and natrium, or Si and Na. But, as has happened before now with organic bodies, these inorganic couples, on their introduction to each other, at once ran away with each other's husbands and wives. Si, although still keeping his wife O, took Ca and became silicate of lime, while Cl and Na were, like Lot's wife, turned into salt, or chloride of sodium, for their wickedness.

The sand, a clean-grained, slightly brownish sort, just such as a dishonest grocer might select for increasing the gravity specific or otherwise, of his sugar, comes from near Maidstone. There is no end to the quantity of it, and we believe it costs less than 3s a tun in the Thames. There are flints, enough for a hundred years to come, brought up from the chalk pits at Charlton; and the caustic soda and the chlorine of calcium, the latter a waste product of the soda manufacture, are bought of the wholesale chemists. The silicate of soda is made from the flints and caustic soda as follows: The flints are heaped upon iron gratings within a series of cylindrical digesters, of the material, size, and form, of small steam boilers A solution of caustic soda is then added; the digester is then closed steam tight, and the contents are boiled by steam of 70 lb., taken from a neighboring boiler, and led through the solution in a coil of iron pipes. The solution of caustic soda is prepared of a specific gravity of about 1,200.° The flints are dissolved into "soluble glass," and are drawn off in that state, as a clear though imperfectly liquid substance, which is afterward evaporated to a treacly consistency and color, and of a specific gravity of 1,700.°

The sand is completely dried, at the rate of two tuns an hour, within a revolving cylinder, through which hot air is forced by a centrifugal fan. A small portion of finely ground carbonate of lime, say Kentish rag, or even chalk, is mixed with the sand, the more closely to fill the interstices; and each bushel of the mixture is then worked up in a loam mill, along with a gallon of the silicate of soda. Thoroughly mixed with this substance, the sand has a sticky coherence, sufficient to enable it to be molded to any form, and, when well rammed, to retain its shape. if very carefully handled. In this condition—molded, of course, and any thing that can be done in founder's loam may be done in this sand, sticky with silicate of soda—in this condition it is ready for the solution of chloride of calcium. The instant this is poured upon the molded sand, induration commences. In a minute or so, we hardened little lumps of sand, so slightly stuck together by the silicate of soda that we could hardly keep them from falling to pieces within the fingers, into pebbles so hard that they might be thrown against a wall without breaking, and only a short further saturation was necessary to indurate them throughout. In other words, on the instant of contact, the silicate of soda and the chloride of calcium mutually decompose each other, and reunite as silicate of lime and chloride of sodium, the former practically indestructible in air, the latter, common salt, perfectly deliquescent and removable by washing, although the stone, after the washing, is impermeable to water. Plaster of paris does not set quicker than silicate of soda and chloride of calcium.

The chloric solution is first ladled upon the molded sand, and, the hardening going on, the objects are afterward immersed in the solution itself, wherein large pieces are left for several hours, the solution being boiled in the open tanks by steam led through it in pipes. This expels any air which may have lodged in the stone, and possibly hightens the energy of union with the silicate.

After this the stone is placed, for a longer or shorter time, according to the size of the object, under a shower bath of cold water. This is not, by bathing, to convert it into Bath stone, although were the Bath stone a sandstone, instead of an oolitic formation, this name would do as well as any. The salt, or chloride of sodium, deposited throughout the interstices, is sought out and washed away, in brine, by the water, and were it not that a portion of undecomposed chloride of calcium was also washed out, this brine might be profitably evaporated for common salt. Now this searching out of the salt by the water would appear to prove that the stone was perfectly permeable, but, by one of those paradoxes with which chemistry abounds, the stone, when once freed from salt, is almost impermeable. The action is one which, if it can be explained at all, can only be explained as one of the phenomena of dialysis, as experimentally investigated by Professor Graham. There is no doubt whatever that salt has been deposited everywhere throughout the stone, no doubt that it is afterward completely washed out, and yet the stone as effectually resists the passage of water afterward as if it were granite or marble.

It is not necessary to describe the variety of objects that may be made in the new stone. It is practically a fictile manufacture, although not indurated by fire, and, unlike fictile goods, having no shrinkage or alteration of color in the making. Whatever the required size of the finished stone it is molded exactly to that size, with no allowance as in molding fire clay goods or in pattern making for castings in iron, The heaviest blocks for works of stability, and the most elaborately ornamented capitals, tracery, or copies of statuary may be made with almost equal facility. For any purpose for which natural stone has ever been used for construction or architectural ornament, the artificial stone will fitly take its place. Mr. Fowler has used it extensively in the stations of the Metropolitan Railway; Messrs. Lucas Brothers have used it with success in various works; several manufacturers at Ipswich and elsewhere have the bed stones of their steam engines, steam hammers, oil mills, etc., formed of the new stone. Mr. Ransome has molded a large number of Ionic capitals for the New Zealand post office, and still more richly embellished capitals, modeled from those of the Erectheum at Athens, for public buildings at Calcutta, beside a great amount of decorative work for English architects.—*Engineering.*

Novel Lifeboat.

There is now in process of construction at the yard of G. W. Alexander, in Philadelphia, a lifeboat of the ordinary form with detaching apparatus, and a peculiarity which was wanting in all the boats exhibited before the Commissioners. However successful each of them promised to be in keeping afloat in the most troubled sea, not one of them in any way insured its passengers from being washed away or submerged by a sea breaking on or over. This last desideratum, and not the least important one, this novel invention claims to supply. The boat proper is arched over by a light metal skeleton ribwork stretching from gunwale to gunwale, and there secured. Upon this frame work is extended a double covering composed of canvas and india-rubber, firmly secured to the boat. The double covering is capable of inflation, and thus renders the entire structure extremely buoyant. An opening in the cover, three feet by four, admits the passengers. This opening is around the mast, and by a peculiar arrangement can be hermetically closed when passengers and crew have entered. The mast, which is of metal and hollow, is used as a ventilator, and in conjunction with a small fan of simple construction and easy operation, serves as the means of producing two currents of air—one of foul air generated in the boat when tenanted, and another of pure air to take its place.

It is claimed for this boat that when completed, it can be prepared for launching as rapidly as any other; that owing to its not careening when weighed upon on either side, passengers will enter with safety; that it is certain to fall with its load as it ought to do from the davits, and that when on the sea, however tempestuous, it will be impossible to swamp it, being water-proof above and below. It is to be propelled by oars, passed out through apertures, so constructed as to admit of no leakage, and an arrangement in the cover permits a look-out to the steersman. This novel boat, in which, if practice will bear out theory, passengers can be rescued from shipwreck and sustained through the worst weather for many days, will undergo a test down the bay in a short time, where a severe trial will be made of the peculiar and valuable qualities she claims to possess exclusively.

For the Scientific American.

FLINT GLASS MANUFACTURE.

Knowing the deep interest you take in the manufacturing business and the working classes in general and with what readiness you receive in your columns anything tending to ameliorate their position, I would submit to you a few remarks on an important branch of our national manufacture viz. flint glass.

Recently I had occasion to consult a document showing the amount of trade carried on by France with Chili and Brazil. I was struck with the large quaniity of glass that country sends to our neighbors. Why should it be so? Is it the fault of our merchants or our manufacturers? The fault is more particularly with our manufacturers and we will try to prove our assertion in the following lines:

Let us see first what resources we possess. We have sand in abundance and of the first quality such as the Berkshire in Massachusetts and St. Genevieve in Missouri. Sand is also found in Virginia fully equal to the Berkshire, in South Carolina, Georgia, Alabama etc.

As to fire clay, besides the superior quality found in Cheltenham in Missouri, it is found in Kentucky, Virginia, South Carolina and Georgia, awaiting skillful hands to make it useful, when manufacturers will get so far over their prejudices as to give it a fair trial. Potashis at our door and lead is found in abundance in Missouri, Illinois, Iowa, etc. Wood and coal is plenty in several localities.

It will be noticed from the foregoing lines that Missouri is one of the states offering the most advantages for flint glass manufacturing, containing every material needed and in sufficient quantity to furnish glass to the United States, for centuries to come.

France has but little or no lead, it is brought from Spain and England: Potash is sent from this country: Sand is scarce and of inferior quality compared with that found in this country: Fire clay is dear as well as coal and wood.

What is there wanting to enable manufacturers here to compete with the French in supplying markets at our door? If we consult manufacturers they will say that labor is much higher here than in Europe; this is true, but nature has given us advantages that more than offset this difference.

The fault in our opinion is to be found somewhere else. First our wares are as a general thing too heavy and clumsy: moreover they are not in accordance with the taste of other countries, such as Brazil, Chili etc., where light and tasty wares richly cut are better appreciated. Our wares necessitate a large quantity of glass, fully double of what would be required in France for the same purpose. It is established here beyond a doubt that French manufacturers have kept their superiority in this style of wares, and know how to take advantage of it by having styles adapted to the taste and uses of different countries. Why should not our manufacturers do the same? Workmen here are not inferior to those of Europe, they are only waiting for the proper hands to guide them to obtain the same result, and moreover our heavy clumsy wares are an imposition and a tax on our consumers who have to pay for a large quantity of materials of no use to them whatever, this however yielded no larger profit to manufacturer. What can we do but grieve and bear it when we have no choice and a prohibitory tariff is now in force to protect a branch of manufacture in existence in this country for a number of years. In consequence, manufacturers are nearly entirely indifferent in adopting means to improve their business.

The principal fault is in the management: our want of system and control in order to remedy abuses, and in a word, in a wrong application of the productive forces.

In France the management is always entrusted to the hands of a superintendent capable of managing every branch of the factory, and under his immediate orders are placed the subaltern employes. It is indispensible for him to know every particular in manufacturing, from the buying of the materials up to the sale of the wares. It is evident that no one better than himself is able to establish cost prices. It is well to note here that the cost price of an article is of more importance than the price of sale, as competition can only be overcome by reducing the former. Cost price therefore, is the thermometer of the manufacturer; it shows him whether he is able to maintain competition, shows him the reasonable limit to which it ought to go; it is by its agency that an approaching failure in business is foretold.

French workmen in glass manufactories are paid as follows.—They have stated wages, varying according to the intellectual capacity and skill of each, but the cost price, of each article is ascertained before hand from an average taken of the quantity made by each set of hands, and if subsequently the amount of work performed exceeds in value the amount of wages paid, the amount of this excess is distributed among each set of hands according to a certain pro rata, in the shape of extra compensation, thus stimulating the workmen to do their best for their own interest and that of their employer; for this reason they would not suffer the management to remain in the hands of incompetent parties who would be impediments in the way of their interest. Glass blowers moreover, are well paid and well thought of in France. Besides their ample pecuniary remuneration they are certain to possess the esteem of their managers who can appreciate their capacity. This is one of the surest stimulants to increased production.

Flint-glass manufactories excepting a few in this country, are generally managed as follows. Often times the manager of the factory is an individual who is completely ignorant of the first principles of the business, he therefore delegates his power to a foreman who may be better acquainted with intrigue than with the practical knowledge required of him, he is therefore at the mercy of his hands. At other times it may be an ex-blower who, though he may be an excellent workman, from the want of a general knowledge of the business, fails. In either case it follows that each hand is a sort of manager from the pot maker to the man at the grates, each of whom is supposed to have a deliberative voice in the management of the establishment. In such a state of things a consciencious and skillfull workman becomes indifferent and disgusted. It is a self evident truth that where order and good management reigns, every one contributes to the success of the establishment with his good will and skill; in a word, harmony is pleasing to all.

Having alluded to fire clay, above, being found in large quantities in this country let me say why this immense resource has not been made as useful as it should have been. Were it not for the intelligent discrimination manifested by a glass manufacturer, now of Philadelphia, Mr. W. T. Gillender, the utility of Missouri clay for pot making would be to this day a mooted point. Each glass manufacturer as is well known, manufactures its own pots for melting, and the pot maker is an important personage, at least in his own estimation, owing to the peculiar state of things existing. It is a noted fact that each factory pretends to have the best pots and the best pot maker, an opinion easily formed by those not acquainted with the properties of fire clay.

Let us suppose that clay is given to a pot maker, keeping him in ignorance of where it comes from, in order to avoid the splitting rock of his prejudices. Let him make a pot in his usual way. If the pot is not successful, he having learned his trade in the old routine, it is useless to seek a remedy from him, for let him tread out of his usual circle, he is lost and will not fail to charge the failure to the bad quality of the clay, and as I said before, his all-powerful opinion will shape that of his employer. The success of a factory depending especially on the good quality of pots, care should be taken and researches made by the manufacturer to attain the utmost perfection in this important branch instead of being dependent upon ignorant pot makers. This would not happen if the manager was well acquainted with this business; the success of this branch would depend upon him entirely. American clay properly prepared and well proportioned without addition of any other clay, is capable of making as good pots as those made from clay brought from Europe at great expense. J. P. COLNE

Washington, D. C.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

A Mechanical Question.

MESSRS. EDITORS:—A gentleman in this section of country has been testing the draft of different wheel carriages to ascertain the most perfect construction that can be made to secure the ease of draft. His experiments show that 100 lbs. weight can be drawn up an inclined plane that rises four and a half inches in four feet, with 8 lbs. and 14 ounces draft and he expects to make the draft a few ounces less.

Be that as it may, the present development is a contradiction of correctness of scientific formulas upon which calculations are made. Not taking into account any allowance for friction, the formulas say that power is gained in proportion to the increased space through which it moves over that of the object moved.

According to the theory, four and a-half inches are contained in four feet, 10 and a little over $\frac{7}{10}$ times, which amount of hight the 100 lbs. weight is lifted, in moving four feet horizontally. Now if we divide the 100 lbs. lifted, by the draft of 8 lbs. and 14 ounces, it will be found that the draft is contained in the weight 11 and a little over $\frac{1}{10}$ times.