Correspondence.

Hints about Refrigerators.

To the Editor of the Scientific American:

I would suggest that the trouble in making ice keep in most refrigerators will be found mainly in the waste pipe. The cold air in the refrigerator is much heavier than the warm air outside, and runs out of the waste pipe on the same principle that warm air goes up a flue. To supply the air constantly running away, warm air is drawn into the refrigerator at every crevice. The waste pipe should have a suitable trap to prevent the cold air from flowing out. The common "U" trap is faulty, from its liability to get clogged with dirt. The end of the pipe should pass an inch or two into the top of a large dish. This fills with water and overflows, thus effectually preventing all escape of air.

"A large, nice refrigerator" is a delusion and a snare. The only refrigerator worth house room is a box with no opening except at the top, and a waste pipe provided with a trap. In such a box there is no movement of air; the heavy, cold air settles in it and stays like water in a dish. Such a box, protected with four or five inches of charcoal or sawdust hermetically sealed, will not require fifty pounds of ice a week. If any circulation, however slight, is permitted through the non-conducting material, moisture is condensed, and the packing becomes soggy and useless.

The patent refrigerators having ice in a box at the top and storage room below, can be made to do good service and economize ice only by having the side doors fitted with rubber strips and lever latches to hold them tight, so as to prevent the constant outflow of cold air and the resulting constant inflow of warm air at the top.

GEO. WING.

Faribault, Minnesota, July 11, 1885.

Cinder Concrete.

To the Editor of the Scientific American:

An article in last week's number of the SCIENTIFIC AMERICAN, on "Clinkers Concrete," suggests the following:

For more than 30 years I have used the glassy slag from our cupolas in making foundations for lathes, engines, stacks, or chimneys, and buildings. For foundations for buildings where the location requires piling, we put a log or several thicknesses of hemlock joist on top of the piling, and on top of this a concrete wall from 2 to 3 feet in depth, and in thickness according to the thickness of the walls of the building. For lathes, engines, etc., if on marsh or made land, we pile, or make a plank platform without piles, according to the character of the ground, the piles being cut off or the platform placed from 4 to 8 feet below the surface of the ground, as the case may be. On this platform we put concrete made of cinders, to the top of the ground; above t'ie ground we generally use hard brick.

These conretc foundations and walls are made by placing in the trench or hole layers of cinder about 6 inches thick, made tolerably level on top and rammed. Each layer is grouted separately with sand and cement, in proportions of two-thirds and one-third respectively; or if the ground is a dry one, or if not too wet, we grout with common lime mortar with a small portion of hydraulic cement added.

I have found the burned sand from the cores of railroad wheels, and the sand in which railroad wheels are pitted to cool, to make a hard and durable cement when mixed with the proper quantity of common lime. We use this sand for laying stone and brick in preference to that generally used by bricklayers; we also use it for concrete.

In grouting concrete foundations, care should be taken to fill all the interstices, making the grout thin so that it will run freely.

I have had occasion to remove a brick wall laid in mortar made of this burned sand and common lime, that was so strongly cemented together that the bricks would not separate at the joints, but split between the joints.

GEO. G. LOBDELL,
President Lobdell Car Wheel Co.

Wilmington, Del., July 24, 1885.

The Heat of Boiler Water.

To the Editor of the Scientific American:

In your issue of August 1, Mr. W. D. Evans has seen fit to criticise Mr. Williamson's article on steam engineering, but I should like to ask the attention of your readers to the fact that the paragraph called in question is nevertheless not incorrect.

Mr. Evans objects to the expression "requisite amount of heat," but I think that by re-reading the sentence in which it occurs, he will find it less indigestible.

The statement made in Mr. Williamson's article, that "one cubic inch of water, with the requisite amount of heat, and at normal pressure, flashes into sixteen hundred cubic inches of steam," is perfectly correct, but would cease to be so were either modifying clause omitted, for it is not customary for water to flash into steam without the agency of heat, nor would it occupy the volume named under more than ordinary atmospheric pressure. The illustration added, "as would be the case in the bursting of a steam boiler," detracts nothing from the truth of the general statement. It simply expresses the fact (and I think most readers so understood it) that the removal of the pressure by the bursting of the boiler realized the conditions recited: water which, before, though above the normal boiling point, remained as such, would, on being released from pressure, be instantly converted into steam, so far as the accumulated energy permitted, and would produce those destructive effects with which every engineer is so well acquainted.

The researches of Professor Bunsen into the cause of geyser action are a beautiful illustration of the case in point.

Mr. Williamson's further parenthetic statement that the expansion of gunpowder on explosion is no more than equal to that of water into steam is not less correct. It is stated, I take it, simply as an interesting fact emphasizing the power of heated water when allowed to flash into steam, and not with any idea of connecting or comparing it with boiler explosions. I am quite sure that it was not his intention to assert the equal destructibility of water and gunpowder, or to maintain that an exploding boiler might as well be filled with gunpowder as hot water, as might be inferred from the criticism. Nor can I agree with Mr. Evans that any expressions in the article give rise to such an intimation.

Under these circumstances, I do not think that Mr. Williamson's critic is justified in offering as the *raison d'etre* of his communication that he dislikes "to see statements which so much exaggerate the facts, or which cannot be verified by the accepted theories of heat and steam."

PORPHYRY DYKE.

Philadelphia, August 1, 1885.

Linseed Oil and Its Uses.

Linseed oil is generally prepared by cold or warm pressing of linseed. Its employment in the manufacture of oil paints is owing to its drying properties. When spread out in thin layers, it dries and forms a solid, varnish-like body.

Fresh linseed oil always contains watery and gummy bodies, from which it must be separated before being used. The simplest method for purifying and clarifying linseed oil consists in storing it for several months and then carefully drawing it off from the sediment. The coloration and oxidation of linseed oil is due to the absorption of oxygen from the air, and it is for this reason that the linseed oil should be stored in hermetically sealed vessels, if possible in the dark.

When linseed oil is to be used for paints, its drying properties must be improved; that is, it must be converted into a varnish. For this purpose 2½ parts of litharge are placed into an iron or copper boiler with 50 parts of old clarified linseed oil. The oil is then carefully heated to boiling. At the end of about one hour a dirty scum forms on the surface of the oil, which must be removed as it forms. Precautions must be taken to prevent the oil from boiling over. It is advisable to have a proper cover and wet cloths at hand for extinguishing the fire in case the oil should become overheated. On a large scale jacketed boilers heated by steam are used. After the oil has boiled 3·4 hours, it is allowed to cool and settle. At the end of 2 or 3 days, sometimes after 24 hours, the clear oil is drawn off. The linseed oil varnish obtained in this way has a pale wine color, is clear and transparent, and more viscous than the original oil. It does not froth when poured out, and dries to an almost colorless mass. Linseed oil varnish should be kept in bottles. It may be ground with various colors, and used for painting wood, iron, brick work, etc. Melted together with resins, especially with copal and amber, it may be used as a waterproof paint on wood, etc.

To make a white oil paint, this linseed oil varnish is generally ground with lead; and in case colored paints are to be prepared, ocher, Naples yellow, terra de Sienna, chrome red, vermilion, etc., are added. When wooden floors are to be painted, they should first be saturated with linseed oil. For this purpose the oil should not be used cold, but always warm, because the heated oil is more fluid, and penetrates the wood to a greater depth.

Oil putties generally consist of linseed oil, varnish, and litharge, or calcined chalk. This putty is gradually converted into a soap, which is perfectly insoluble in water. Its hardness may be increased by the addition of quartz sand or brick dust.

In painting, the finest purified and bleached linseed is often required. Such an oil may be prepared by treating the varnish, prepared as above, with a solution of sugar of lead. The sugar of lead solution is prepared by dissolving 1 part of sugar of lead in 16 parts of alcohol; 100 pounds of linseed oil are heated to 85 to 90 degrees, and then thoroughly mixed with 5 or 6 pounds of the alcoholic lead solution. The oil is then left at rest for 3 to 4 days, and the clear, bleached oil is drawn off from the sediment. The sediment may be freed from the gummy matter by filtration.—*H., in O., P. & D. Reporter.*

No Right to Pollute Wells.

An interesting point as to the right of one of two owners of a well having a common source of supply from underground water to restrain the neighboring owner from so dealing with his well as to cause the water which the other owner pumped out of his well to be polluted, has recently been decided by the Court of Appeals, in the case of Ballard *vs.* Tomlinson, all three judges agreeing to set aside the judgment of the court of first instance. The plaintiff drew his water from a well sunk to a depth of 222 feet into the London clay, and bricked around. From the bottom of the well a pipe was carried through the Thanet sand into the chalk to a depth of about 300 feet from the surface. From the sand and chalk, which were water bearing strata, the water found its way by natural pressure into the well, from which the plaintiff raised it by pumping. About 99 yards from the well the defendant had another well of similar construction, and going down to about the same depth in the sand and chalk, but the surface of the ground was about 10 feet higher than at the plaintiff's well. Both wells were supplied from the same subterranean water. The defendant having ceased to use his well, made a drain, by which sewage was discharged into it. The plaintiff complained that the sewage had polluted the water in his well; and he claimed an injunction to restrain the defendant from so using his well as to pollute the water in or coming into the plaintiff's well, and also claimed damages for pollution. It was argued for the plaintiff that, although there can be no property in underground water flowing in natural undefined channels, and, therefore, that a land owner may so deal with such water as to deprive his neighbor of it, yet he cannot so use his well as to prevent his neighbor from drawing pure water. It was also said that the defendant's well and pipe were artificial channels, so that he was responsible for the consequences of allowing sewage to flow into the well. For the defendant, it was argued that he had not polluted any water in which the plaintiff had any property, and that if the plaintiff chose to draw the water from the common supply, he must take it as he found it.

In giving judgment, the Master of the Rolls—Lord Justices Cotton and Lindley concurring—held that the defendant had polluted the common reservoir of water by collecting sewage in an artificial shaft, and that no one has at any time any property in water percolating below the surface of the soil, even while it is under his land; every one has a right to appropriate such water, and may prevent it from going on the land of others. One neighbor may actually cause the water of his neighbor to come upon his own land, and deprive him of it with impunity; every one has a right to appropriate the whole percolating water, since this is a common reservoir or source, in which no one has any property, but from which any one has a right to appropriate any quantity. As to the question whether any one of those who have that unlimited right of appropriation has a right to contaminate the common reservoir, or whether he is bound not to do anything which would prevent any of those persons obtaining the value of their right, the court held that, inasmuch as every one has a right to appropriate the common source, he has a right to appropriate it in a natural state, and no one has a right to contaminate the common source. As to the point that the pollution would not have been caused if the plaintiff had not used artificial means by pumping, and, therefore, that it must be taken to have been his act, that was not a true proposition. So long as a person does not use any means which are unlawful, as against his neighbors, however artificial those means may be, he has a right to use them. The question of natural and unnatural user only goes to this, that, although a defendant does contaminate the water which goes on his neighbor's land, yet, if that act is only what has been called the natural user of the land, and although by that act the neighbor is injured, the defendant is not liable, because, otherwise, he could not use his land at all. The question did not depend upon the persons being contiguous neighbors; it signified not how far the plaintiff was distant from the defendant if it was shown that the defendant contaminated the common source of water. Summarily, no one has any right in percolating water, which, as it comes from a common source, every one has a right to appropriate; but, equally, no one has a right to injure. The decision reversing the previous one of Mr. Justice Pearson is a highly satisfactory one.—*Brit. Med. Jour.*

Bridging Lake Champlain.

A contract for a great bridge across Lake Champlain, from North Hero to Alburg, has been awarded to the R. Hawkins Iron Works, Springfield, Mass., for a little less than $50,000. The structure will be the first iron bridge across Lake Champlain.