durability of the lumber, as well as its beauty of finish, to say nothing of time and expense.

In contrast with the foregoing plans we will now examine the new mode, that seasons and dries at the same time, by what is called superheated steam without pressure, or with the simple pressure of the atmosphere. No other mode known to science has ever accomplished this, and yet the process is a very simple one, as I shall attempt to show, though I may fail to make it fully understood in an article that would not be too long for insertion here. If the principle, however, should still be obscure to any one they can inquire by mail.

Suppose a room 14 feet high be divided so that the lower room shall be 8 feet and the upper one 6 feet high. The lower we will call the fire steam room, and the upper the lumber or drying room. The division, however, between these rooms is only the joist on which the lumber is piled, or that sustains the cars on which the lumber is dried, and on which it is passed into and out of the dryer. The two rooms are, therefore, virtually one.

A stove or other heater, with long radiating or smoke pipe, to save all of the heat from escaping into the chimney, as well as to generate heat rapidly, is placed in the fire room, with the door of the stove opening out to supply fuel. This stove and the radiators are placed quite at the lower part of the fire room, which avoids the direct heat of the stove on the lumber, and also to occupy the coldest part of the room, which is the most favorable for obtaining all the heat of the fuel.

A steam generator may be so arranged at a small expense, in connection with the heater, that steam will be generated just in proportion to the heat made.

This steam, whether generated in this or in some other convenient way, should be just sufficient in amount to fill both the fire and lumber room, with no steam to pass off to waste the heat. As soon as the rooms are filled with steam the air is excluded and the steam takes its place for conveying caloric. Steam will convey heat by convection 90 to 300 times as rapidly as air.

This steam atmosphere is not one that can be seen but one that can be felt. It starts a free perspiration from all of the pores of the skin when you go into the kiln. It does the same thing to lumber, for it never wets or swells the lumber as by common steam, but the first act is a drying one, as the tendency of the moisture of the lumber is all outward; let us see how this is accomplished.

Steam as soon as it is generated rises. As soon, however, as a particle of steam meets a body colder than itself it instantly imparts its heat to that body and is condensed. This particle of condensed steam descends by its own gravity to the fire room. Here it comes into contact with the stove or radiators, and is re-converted into steam, and carries its heat to the lumber and descends again in its condensed form for more heat. This one particle of steam may carry up heat in this way a million times, and yet it has imparted no moisture to the lumber, as it has returned with its moisture in the shape of condensed steam. If by any accident this one particle of steam is absorbed or lost, the steam generator supplies another particle to take its place, and thus preserves a constant steam atmosphere among the timber, not only to convey heat but to shut out the air.

It is worthy of note in this connection, to state that a particle of steam will instantly receive as many degrees of heat as there are degrees in the heater with which it may come in contact. If for instance the stove should be red-hot, and the particle of returning or condensed steam should come in contact with the red-hot iron, this particle of steam would instantly receive at least 900 degrees of heat. This 900 degrees of heat would be carried to the lumber, and the condensed particle of steam would return for more heat in the same time as though it carried only 212 or any other number of degrees of heat.

It is also worthy of note that the tendency of steam is to fly to the coldest place to impart its heat. If, for instance, a ball of ice were suspended at the ceiling of a room, and some water should be thrown upon a hot stove in the room the steam thus generated would go continually to the ice until it was melted. Thus as an equalizer of heat steam has no equal

This superheating and condensing of steam in particles goes constantly on in the kiln, and with a rapidity just in proportion to the amount of heat generated by the stove or heater. All of the heat which the stove makes the steam will absorb and convey to the lumber. If heat is generated rapidly the steam will convey it rapidly to the lumber. Inch lumber has in this way been thoroughly seasoned in six hours.

This mode of heating and condensing progresses until the lumber is so hot that the aqueous or watery portion of the sap is changed into steam.

Up to this time you will notice all of the heat we have made is yet in the kiln, for there has been no means of escape to waste it, nor have we made the lumber wet or damp by the steam since the steam has only imparted its heat and not its moisture or condensed steam.

But when the lumber is all so hot as to generate steam rapidly from the water it contains, then there will be more steam than the kiln can contain, for it was full of steam before. This excess of steam must pass out of the kiln or the kiln would burst and the lumber would never become dry.

When this surplus heat passes out it escapes through sawdust or a similar device to retain the heat while getting rid of the steam. This sawdust should be of such a thickness as to balance the steam, retaining a full steam atmosphere inside, while the surplus steam passes out, taking with it the moisture from the lumber. As there is a steam atmosphere at all times surrounding the lumber to be dried, it cannot dry the outside first and form an enamel, as in the case of air drying.

The nature of steam is so penetrating that it finds the center of the lumber, before the drying has made any considerable progress. After the drying commences steam generated from the lumber is constantly flowing out, so that the pores of the lumber cannot close until the moisture is principally out of the lumber, and then the center must dry first, for the steam must leave the center before it leaves the outside.

When the aqueous portion of the sap has all been converted into steam and passed out of the lumber, it creates a vacuum which the pores of the lumber close to supply. When this is done the lumber has shrunk to its smallest size, or to as nearly a solid as drying can make it.

But as there is moisture in red-hot iron, so there must be some moisture left in the lumber after the pores close and after the shrinking is all done. Indeed if the moisture was all removed the lumber would be ruined for charring commences long before the moisture is all out.

By gaging a piece of timber in the kiln from day to day, it is quite easy to ascertain when the shrinking is all done. When the shrinking of the lumber is completed there is no further advantage in drying, but a positive injury, as far as the strength and toughness is concerned, for the more moisture there is left in the lumber and timber after the shrinking is all done, the better. If desired, however, the lumber may come from the steam in a dryer state than the air can ever make it.

I am admonished, however, that this article will soon be too long for insertion in the Scientific American, and I will reserve, perhaps for No. 3, the degrees of heat necessary to coagulate albumen in lumber at its different stages of drying, and perhaps say something of the degrees of this kind of heat desirable in the drying of fruit and vegetables, and also show why we may use a higher degree of this kind of heat than of air in drying delicate fruits, milk, etc., and still not injure them. I have dried apples in a heat of 239° and still they showed no indications of being cooked by the process, but came out very white and beautiful.

But before I close I will bring into juxtaposition superheated steam and other modes of drying, in order to show the advantages of superheated steam by comparison.

The air dries only. Superheated steam seasons and dries at the same time. The air dries slowly—steam quickly. The air produces decay and wastes heat while drying. Superheated steam adds strength and beauty of finish and saves heat. The interest on lumber while air drying must be for years—steam for days. Air can never shrink lumber so thoroughly that steam can not shrink it more, either in size or weight.

Common steaming, kyanizing, paynizing, and burnetizing, all season lumber, but swell it to its utmost capacity, and leave it wet and soaked. It would require more fire to dry this soaked lumber by the hot air process than to season and dry it from the green by the new mode. If the lumber is to be immediately shipped the difference in weight will be from 1400 to 2000 pounds per thousand feet board measure.

One month's stock of lumber for a manufacturer having a proper steam dryer will give him better seasoned lumber than a four years' stock in the air, thus saving the interest on stock, storage, checks, splits, warps and decay, incident to open air drying. The interest at 10 per cent on lumber costing only 40 cents per M. will be $16 while air drying for four years, and then that same lumber is not fit for good work unless kiln dried. It can be seasoned and dried by superheated steam, in a better manner than any other, at a cost of 50 cents to $1 per M., according to the expense of fuel. H. G. Bulkley.

Cleveland, Ohio, Jan. 9, 1865.

VALUABLE PRACTICAL RECIPES.

To Etch Alabaster—Cover every portion of the model or cast, except the portion to be etched, with a mixture of one part of white wax, dissolved in four parts of oil of turpentine, thickened with finely powdered white lead. When this coating is set, immerse the article in pure water, and allow it to remain for from twenty to fifty hours, according to the effect intended to be produced. Then take it out, remove the superfluous water, wash off the varnish with oil of turpentine, and carefully brush the etched parts over with powdered gypsum.

Alabaster, to Join.—Ornaments of alabaster or plaster may be joined together by means of a little white of egg, thickened with finely-powdered quicklime, or by a mixture of newly-baked and finely-powdered plaster of paris, mixed up with the least possible quantity of water.

Almond Paste.—Blanched almonds 4 oz.; white of 1 egg; spirit of wine and rose water, q. s. Beat the almonds to a smooth paste in a mortar, then add the white of egg and enough rose water, mixed with one-half its weight of spirit of wine, to give the proper consistence. Use as a cosmetic, to prevent chapped hands, etc.

Amber is Joined and Mended by smearing the surfaces of the pieces with linseed or boiled oil, and then strongly pressing them together, at the same time holding them over a charcoal fire, or heating them in any other way in which they will not be exposed to injury.

Amber is Worked in a lathe, polished with whiting and water or oil, and finished off by friction with flannel. During the operation the pieces often become hot and electrical, and fly into fragments, to avoid which they should be kept cool, and only worked for a short period at a time. The workmen are said to suffer considerably from electrical excitement, often experiencing severe nervous tremors of the hands and arms.

Bell Metal.—Melt together, under powdered charcoal, 100 parts of pure copper, with 20 parts of tin, and unite the two metals by frequently stirring the mass. Product very fine. Another method is to take of copper 3 parts; tin 1 part, as above. Some of the finest church bells in the world have this composition.

Popular Remedies for Coughs.—Sirup of poppies, 1 dessert-spoonful; antimonial wine 20 drops; mix for a dose, to be taken in a little warm tea on going to bed. Another—Laudanum 30 drops, vinegar and honey, of each a dessert-spoonful, ipecacuanha wine 25 drops; mix for one dose, as last. Another: milk of almonds 4 oz., sirup of squills and tolu, of each, 1 oz.; mix. A tablespoonful every two hours.

Furs may be preserved from moths and insects by placing a little colocynth pulp (bitter apples), or spices—as cloves, pimento, etc.—wrapped in muslin among them; or they may be washed in a very weak solution of corrosive sublimate in warm water, 10 or 15 grains to the pint, and afterwards carefully dried. Furs, as well as every other species of clothing, should be kept in a clean dry place.

Portable Lemonade.—Tartaric or citric acid, 1 oz.,

finely-powdered loaf sugar ½ lb., essence of lemon 20 drops; mix; 2 or three spoonsful make a very pleasant glass of extemporaneous lemonade. Another—Powdered sugar 4 lbs.; citric or tartaric acid 1 oz.; essence of lemon 2 dr.; mix well. As last. Very sweet and agreeable.

Tinning.—Plates or vessels of brass or copper, boiled with a solution of stannate of potassa, mixed with turnings of tin, become, in the course of a few minutes, covered with a firmly attached layer of pure tin. A similar effect is produced by boiling the articles with tin filings and caustic alkali, or cream of tartar, In the above way, chemical vessels made of copper or brass may be easily and perfectly tinned.

New Tinning Process.—The articles to be tinned are first covered with dilute sulphuric acid, and when quite clean in warm water, then dipped in a solution of muriatic acid, copper and zinc, and then plunged into a tin bath to which a small quantity of zinc has been added. When the tinning is finished, the articles are taken out and plunged into boiling water. The operation is completed by placing them in a very warm sand bath. This last process softens the iron.

Kustitien's Metal for Tinning.—Malleable iron 1 lb., heat to whiteness; add 5 ounces regulus of antimony, and Molucca tin 24 pounds.

The Water Supply of London.

A London weekly paper says:—Three of the great water companies extend their suction pipes of supply as far as Hampton. Miles and miles into the country we may see great mains a yard in diameter, dipping under the Thames, crossing the deep ditches, and passing along the fields and furzy commons, at certain points intercommunicating with each other, in case either may require temporary help. The far off source is little dreamed of by the thirsty soul, who quaffs from the drinking fountain in the crowded street.

He little fancies that he is sucking from a stream through ten miles of iron pipe, the end of which dips into the Thames close to Wolsey's pleasant palace. The great mains of all the companies are thirty six inches in diameter, and it must be remembered that they are free and fully charged at all times, so that in case of fire the fireman has only to turn the plug to get any quantity of water he requires. In some cases—such as at the great fire in Tooley street—thousands of tons of water are thus abstracted gratuitously without interfering with the supply to the houses.

"At the beginning of the present century, the mains, indeed all the pipes, were wooden—the trunk of trees bored out—and in no case of more than one foot in diameter. How the metropolitan giant must have grown, the size of his present iron arteries is a proof. The mains of the eight water companies not only supply London proper, but push far out into the country, invading even the agricultural districts, and supplying its farms. They distribute in the aggregate upwards of 100,000,000 of gallons daily, through 30,000 houses and factories, through capillary pipes upwards of 7,000 miles in length.

If all the water daily used in this great city were collected in one great reservoir, it would cover seventy acres in extent and six feet in depth. As the spectator watched this great expanse of water, he would see it hour by hour drained to the bottom by the collective millions in the metropolis as calmly and noiselessly as a cup is drained by a dusty roadside traveler. The collective iron heart, the steam engines which propel this flood, possesses a force of not less than nine thousand horses.

The Art of Agriculture.

The art of agriculture consists in three things—in keeping the soil rich, light, and free from weeds. If this is done any plant will grow vigorously, if it is not done, no plant will grow.

IN MAN, there is but 6 ounces' weight of stomach to 100 lbs. of body, which is one reason why our food must be in a concentrated form, and why, although the potato or other vegetables may keep us in good flesh, yet to sustain the energies of the system, particularly for those who do the most labor, the greater concentration of a meat diet is absolutely essential.

Correspondence

Rollers Under Slide Valves.

MESSRS. EDITORS:—A remark on page 47 relating to the large engines for the new fast frigates, explaining that the valves have steel rollers under their bottoms and under their steam faces to relieve the friction, says with justice that rollers for this purpose would *seem* to be difficult to regulate so as to be beneficial. The apparent or real difficulties have defeated all efforts at improvements in this direction until quite recently.

There are now a large number of government and private vessels and a larger number of locomotives running with such rollers. They are arranged according to a patent issued to Richard C. Bristol, of Chicago (now residing temporarily in New York), dated Nov. 13, 1860. This engineer has with untiring zeal labored on successive improvements in this line since 1858, and deserves the credit of contributing very largely by these improvements to overcome what might otherwise have been fatal difficulties in our new-school war vessels.

The rollers in all cases are less than two inches in diameter. Under the largest valves they are each about 2½ inches in length and are packed closely together in three lines, one line under each side, and one along a bearing provided in the middle, with liberty in each case to travel back and forward a distance equal to half the greatest travel of the valve. The rollers which take the *weight* of the valve are slighter and of far less consequence. All are of hardened steel, and hardened steel ways are mounted on the valve and also on the cylinder face to support the stress. They are made at first to take very little or no strain, but are very accurately turned of uniform size. As the face of the valve and of the cylinder rapidly wears off under the great friction the rollers begin to support the load and ultimately take nearly the whole of it without inducing leakage.

The Reading Railroad and the Connecticut River Railroad have each had one or more locomotives thus provided upwards of a year. The New York and New Haven Railroad, the New York and Erie, the Chicago and Fort Wayne, Atlantic and Great Western, Michigan Central, Milwaukee and La Cross, and several other important lines of Railroad have more recently applied the same to some of their locomotives. There are many points of importance to be attended to in carrying out the idea, bnt they have been successfully mastered.

THOMAS D. STETSON.

New York, Jan. 20, 1865.

[The rollers under the bottom to carry the weight of the valve strike us as being quite as important as the others, for at that point two metallic surfaces of greater or less area, according to the size of the valve, would be in contact, creating immense friction and adding very much to the labor on the connections. The Government seems to doubt the efficiency of the rollers in the case of the frigates, for the engines to these ships have their valves balanced by other means in addition to the rollers.—EDS.

New York Milk Business.

The milk received in New York comes to the city mostly by rail, and is brought from distances varying from ten to one hundred and fifty miles. The amounts received daily over the principal railroads are: Erie, 88,000 quarts; Harlem, 100,000 quarts; Hudson River, 16,000 quarts. To these amounts must be added 75,000 quarts produced by the city. Although many establishments sell nothing but undiluted milk, still old dealers are honest enough to say that to any calculation concerning the retail business, it is perfectly safe to add twenty per cent for water. The following prices show the increase of rates since 1842. In that year milk was retailed for four cents a quart. In 1854 the price increased to five cents; in 1857 to six cents; in 1862 to seven cents; in 1863 to eight cents, and is now selling for twelve cents. Some idea of the magnitude of the milk business may be gained from the fact that there are over four thousand persons engaged in its distribution in the city A very spirited rivalry has sprung up between the retailers of milk in its crude form and those who condense it. Of the latter there are but three companies in the city; but the amount supplied by them is equal to the sale of at least ten companies dealing only in the crude artic'e. It can be said generally that most companies engaged in the sale of milk have within the last five years sought to sustain an honest reputation by the sale of pure milk only.

MARKET FOR THE MONTH.

The great feature in the markets during the month of January was the great decline in gold, which fell at one time as low as 197. While gold is falling trade from first hands is almost wholly suspended, as jobbers are afraid that they will not be able to sell their goods at cost. On the 25th of the month gold had rallied a little, and prices of the leading staples compared with those at the close of December are as follows:—

	Price Dec. 29.	Price Jan. 25.
Coal (Anth.) ₩ 2,000 lb.	$9 50 @10 50	$12 00 @12 50
Coffee (Java) ₩ lb.	48½@ 50	47 @ 48
Copper (Am. Ingot) ₩ lb.	48½@ 49	45 @ 46½
Cotton (middling) ₩ lb.	1 14 @ 1 15	84 @ 85
Flour (State) ₩ bbl.	$9 45 @10 25	$9 20 @ 9 70
Wheat ₩ bush.	$2 12 @ 2 80	Nominal.
Hay ₩ 100 lb.	$1 50 @ 1 65	$1 50 @ 1 90
Hemp (Am. drs'd) ₩ tun.	340 00@400 00	$320 00@390 00
Hides (city slaughter) ₩ lb.	13 @ 13½	13 @ 13½
India-rubber ₩ lb.	70 @ 1 20	72 @ 1 20
Lead (Am.) ₩ 100 lb.	15 00	13 00
Nails ₩ 100 lb.	$8 50 @ 9 00	8 50 @ 9 00
Petroleum (crude) ₩ gal.	50½@ 51	45 @ 45½
Beef (mess) ₩ bbl.	$19 00 @24 00	19 00 @24 00
Saltpeter ₩ lb.	30	30
Steel (Am. cast) ₩ lb.	19 @ 34	19 @ 34
Sugar (brown) ₩ lb	16½@ 25	16 @ 22
Wool (American Saxony fleece) ₩ lb.	90 @ 1 10	90 @ 1 10
Zinc ₩ lb.	18 @ 19	18 @ 19
Gold	2 24	2 05

Internal Revenue from New York City.

Besides the duties on imports paid by the City of New York, the entire receipts of the National Government here, from ordinary collections, which to the end of December were $27,000,000, and from stamps and special collections about $7,000,000 more, foot up $34,000,000.

The internal revenue estimates for the ensuing year, including $30,000,000 from the Assessors' lists, are $36,000,000. Good judges believe that the aggregate sum which will be returned to the close of the year will not be less than $40,000,000.

RECAPITULATION.

Receipts from Collectors of Internal Revenue in New York to Dec. 1, 1864	$27,000,000
Receipts from sales of revenue stamps	6,000,000
Receipts from banks, insurance companies, and other sources	1,000,000
Total internal revenue in two years and three months in New York	$34,000,000
Estimates for 1865.	
Receipts from Collectors of Revenue	$30,000,000
Receipts from sales of revenue stamps	5,000,000
Receipts from banks and other sources	1,000,000
Total estimate of internal revenue in New York from Jan. 1 to Dec. 1, 1865	$36,000,000

Newspaper Agency Business.

As an interesting item of news, and in order that our readers may have some idea of the enormous business done in this city, at the present time, by newspaper agents, we will mention the fact that the cash receipts of the American News Company for the eleven months ending with the 31st of December last, reached the sum of $2,226,872 83. Within that time forty millions of newspapers alone were handled and packed by persons in the employ of the company. Beside newspapers there were shipped to agents in various sections of the States a vast number of magazines, books, stationery, etc. For wrapping paper and twine with which to pack this vast mass of literary matter the company paid twelve thousand dollars. This is the business of one news agency alone. Ten years ago, in 1854, the total sales abroad by newspaper, book and periodical agency in this city did not exceed three-quarters of a million of dollars. These results are most gratifying, as they assure us that intelligence keeps pace with population, and that the general prosperity of the people has not been checked materially by the insurrection now raging in the slave states.