

A TREATISE
ON THE
HEATING AND VENTILATING
OF
DWELLING HOUSES,

School Houses, Churches,

AND ALL KINDS OF
PUBLIC BUILDINGS,

WITH FULL DIRECTIONS FOR

Using, Managing and Setting Furnaces and Cooking Ranges ; and
a Statement of the kind of Coal best adapted for use in them.

BY WALTER BRYENT,

After Twenty-Five Years Experience in Putting up and Managing Furnaces and Ranges

BOSTON:

J. H. & F. F. FARWELL, PRINTERS.

1861.

HEATING AND VENTILATING.

THE Heating and Ventilating of public and private buildings is one of the most important matters in domestic economy. More money has probably been spent, foolishly, in attempting to gain heat and ventilation economically, by persons without knowledge or experience in the business, than for any other single article in domestic use. Probably not one-fourth of all the furnaces and ranges put up, are used more than two or three years before they are taken down and replaced by others, and in many cases by others no better, causing great and needless expense to the proprietors.

Many persons complain of the quality of the heat they obtain from their furnaces. In many instances their complaints are not groundless. Many furnaces are so constructed that after being in use for a short time their joints get open and gas leaks into the air-chamber. This is a very unpleasant as well as unhealthy effect. The joints in these instances are usually formed by bolting two flat surfaces together, with cement between them. As one part usually heats and cools quicker than the other, the unequal expansion and contraction of the iron will soon loosen the cement, allowing it to work out and form a crack, through which the gas escapes to the air-chamber. Another error of the same kind is, that the different parts are often bolted tightly together, so that when one part expands sooner or more than the other, a crack in the iron is usually produced, and often before the furnace has been but a very short time in use. Still another great mistake is to put radiators on the back of furnaces, so as to force gas and smoke down them by closing dampers. Every one who has used furnaces knows the difficulty of making servants pay proper attention to their management, in this and other par-

ticalars. There are also other objections. It is almost impossible to construct upright joints so that the expansion and contraction of the iron will not open them sufficiently for the gas to escape into the air-chamber. They also operate rather as condensers than as radiators of heat, as forcing the gas and smoke down them checks the current so much that you cannot use dampers in the smoke pipes leading to the flues. Thus more heat will escape by this defect than by letting it pass directly from the top of the furnace to the flue, with a damper in it, properly managed. Another great objection to most furnaces, is the small amount of available radiating surface allowed. They have to be made very hot to heat the air sufficiently to warm the apartments depending on them. The air is very much injured by being over-heated in coming in contact with red-hot iron, and the latter itself is soon destroyed if over-heated.

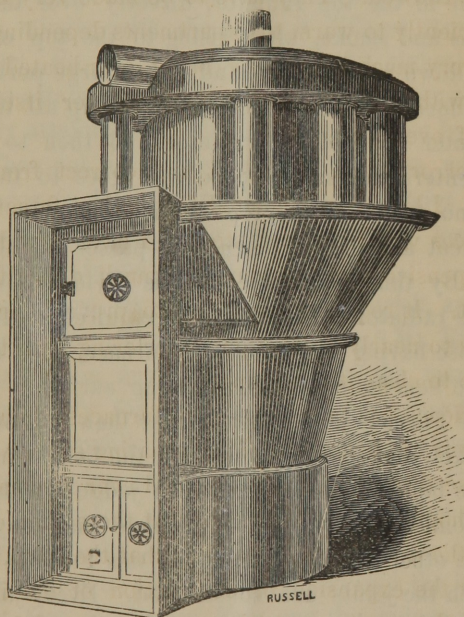
Another error I can point out and correct from my own experience. I have experimented for the last fifteen years in lining furnaces with brick and stone. I have found the practice very expensive, and the source of much difficulty in their management. It requires great care to prevent their clinking up so as to nearly fill the pot, interfering with the turning of the grate to clear it out properly.

My experience has taught me that furnaces should be very simple in their construction. The radiating surface should be very large, so that no part of it should ever become red-hot. The joints should be so constructed that there should never be a strain on the different parts, and so that the packing cannot work out by the expansion or contraction of the iron. The thickness of the castings must be so proportioned that all parts will heat equally, or as nearly so as possible. There should be but one damper, and that in the smoke pipe, near the furnace. It is also advisable to put a collar in the smoke pipe, between the damper and flue, with a stopper, so that it can be drawn out to admit the cold air into the pipe, to check and

regulate the draft. By this means the melting of the coal and the formation of clinkers may be avoided.

I have constructed a Furnace, which six years use in many of the best dwelling houses, churches and school houses of Boston and vicinity, has proved to be the best ever introduced. Hundreds who have had much experience in their use, will testify to this fact. The following is a description of it:

BRYENT'S GREAT RADIATING FIRST PREMIUM FURNACE.



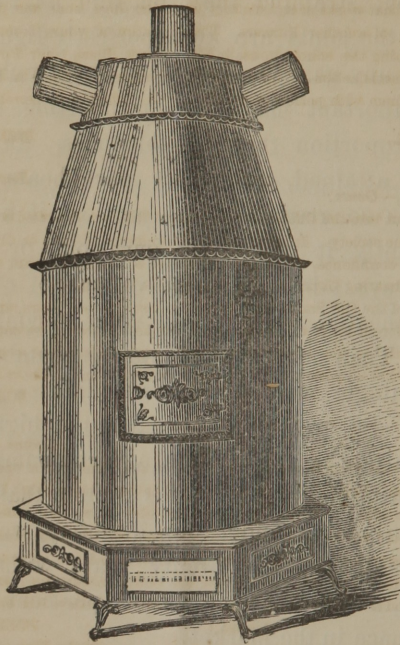
This Furnace is constructed with an iron base and ash pit, similarly to several others. It has a recess front, connecting the ash-pit and feeding apparatus, with large doors for removing the ashes and cinders, and for putting in the fuel. The front is so attached to the base and mouth-piece that it can

rise and fall without straining the iron or opening the joints, as the iron heats and expands. This precaution prevents the escape of gas. The pot is very thick, and considerably smaller at the bottom than top. It is formed with perpendicular scallops. At the top is a large, deep groove, to receive the top, or mouth-piece. Directly over the fire is a large dome or half globe, so formed that in their radiation from the fire in the pot, the rays of heat will strike every part of it, and will heat every part of it as hot as the pot containing the fire. At the bottom of the dome, near the fire, a flange is thrown off, and upon the outside a series of small columns, connected with it, run to the top radiator, directly over the dome, so that the gas and smoke, after rising to the top of the dome are drawn down near the fire, and thus a large portion of the gas is consumed. From thence it passes up all the columns into the outer edge of the radiator, and then to its centre, where it enters the smoke pipe and goes to the chimney. There is no outlet at the top of the dome, but the smoke, gas and heat are drawn down and passes up all the small columns. By this means the heat is divided equally in all parts of the radiator. No damper is required, so that the neglect of those having charge of the Furnace, does not deprive them of the benefits of all its radiating surface. As the surface of this Furnace is one-third larger than that of any other in the market, and so constructed that the benefit from it must all the time be available, any one can judge whether it is not more economical, and easier to manage than any other pattern. One other great advantage in this Furnace is the manner in which the joints are constructed. Every joint is a cup joint. The top of every piece has a groove about one inch wide and an inch deep, with a corresponding edge opposite, running to the bottom of the groove in the centre. When the Furnace is put up these grooves are filled half full of fire proof cement, then filled up, with sand, and the castings worked down through the sand and cement to the bottom of

the groove. There is plenty of room for expansion and contraction without straining the iron, and as the cement can never get out, the joints are kept perfectly tight, rendering it impossible for any gas to escape to the air-chamber. One other very important matter in constructing the castings, is properly to proportion them in thickness. In this Furnace this object is attained, and every part heats nearly alike. The surface is so great that no part of it heats red hot, and consequently it will never burn out, or over-heat the air. We always admit a large volume of cold air, which is moderately heated, and does not come in contact with over-heated iron. Then no gas leaks into the chamber, and plenty of water to mingle with the air as it diffuses itself through the chamber. So we acquire, what is the highest result we ever hope to attain in any furnace, a pure summer atmosphere, economically attained, and with less trouble than by any other means. When put up under our direction, we will warrant these furnaces to last for twenty years without repairs, if properly used, and to consume twenty per cent. less fuel than any other furnace in the market.

We manufacture six sizes to be set in brick, and six sizes that are portable. The largest size, the "Mt. Etna," is one quarter larger than any other furnace in the market, and is designed expressly for heating the larger churches, school houses, and other public buildings. We have never failed, in any instance to give perfect satisfaction when the size we recommend is adopted, so that those wanting furnaces can be sure of avoiding the expense and trouble of changes, by adopting this pattern. This Furnace received the highest premium at the last Mechanics' Fair, and the judges pronounced it to be the best exhibited.

PORTABLE FURNACE.



We append hereto a few of the many testimonials received from some of the gentlemen, best qualified to express an opinion on the subject, in the Commonwealth.

TESTIMONIALS.

Messrs. Bryant & Co.,—Gentlemen :

Old Cambridge, Mass., March, 1861.

I am very much pleased with the operation of your Furnace. It has given me perfect satisfaction, affording me plenty of heat and being very easy to manage. I can with pleasure recommend it for its great heating powers, its simplicity and economy. Every one who uses it must be pleased with it.

JOHN PRYOR, D. D.

Messrs. Bryant & Read,—Gentlemen :

No. 110 Tremont St., May 17, 1861.

I have received the gridiron and shall give it a careful trial, and report to you. The Range I am entirely satisfied with, so far, and my Cook says it is the best she ever used. I shall take pleasure in directing the attention of my clients to it.

Your obed't servant,

EDW. C. CABOT.

Messrs. Bryant & Co.,—Gents :

As you requested my opinion of the merits of your Furnace, I am happy to say that I have never seen a Furnace that works so satisfactory as yours does that was put into the Harvard Street Church in place of another Furnace. The operation of yours is much more satisfactory. Also when I was finishing the school house in High Street Place, your Furnaces were in operation and gave perfect satisfaction. I have had considerable experience in Furnaces as a builder and can recommend them with perfect satisfaction and confidence to be reliable Furnaces.

Boston, Aug. 2. 18 1.

Respectfully,

BENJ. H. FLANDERS.

Messrs. Bryant & Co.,—Gents :

The Furnace you put into the Old South Chapel last fall, has operated to the perfect satisfaction of myself and the society. It has given an abundance of heat in the coldest of weather, and I can with entire confidence, recommend them to all those in want of Furnaces, as being perfectly adapted for heating Churches and other public buildings.

I have had charge of the Old South Church for the last eighteen years, and during that period we have used four different kinds of Furnaces, of the best patterns we could select, but none of them will compare with the one now in use of your manufacture, for economy, simplicity and efficiency. I believe that all persons who try them will confirm the above statement.

WILLIAM LEARNED.

Boston, March 3d, 1860.

*Mr. Walter Bryant:—*At your request I will give you the result of the operation of the Furnace you put into my house. Some two years since, I put into my house what I felt confident was the best Furnace in the market; also, from the great number of recommendations I had presented to me, I felt sure I could not be mistaken in my decision, but after one years trial, I found that I could not make it answer, and last fall I had it removed and one of yours put in, and it has worked much better than the other and given me entire satisfaction; and I can with perfect confidence, recommend it to all to those in want of one, as I believe it is the best Furnace in the market.

(Signed,)

JOSEPH PRATT,

No. 200 Shawmut Avenue.

Of the Firm of Bowers, Pratt & Co.

Boston, January 14th, 1860.

Messrs. Bryant & Co.,—Gents :

We have tried different kinds of Furnaces for heating our school houses, but with the same result. In severe cold weather, the children have had to be dismissed to go home and warm themselves, as the furnace was incapable of heating the house. Last year the district decided to build an addition to their present house, consisting of four large rooms. As there was a strong antipathy against Furnaces (resulting from our previous experience), I was requested as Chairman of the Building Committee, to examine and see which would be the most economical, stoves or a Furnace. After examining the different kinds of Furnaces and stoves, we decided to take one of your Mt. Etna Furnaces, and I am happy to say that the result has been most satisfactory. As the Furnace has required but little care, has furnished ample heat for four rooms, each 26½ x 30½ feet, at a great saving of fuel, and from our experience, I can say that your Furnace is the most economical and best adapted for public buildings of any one that I have ever seen.

Respectfully yours,

T. F. HUTCHINS.

Dedham, Mill Village, 1861.

Messrs. Bryant & Co.,—Gents :

I think it my duty to say to all who wish for a good article, that out of the eight different kind, of Furnaces I now have in use, yours gives the best satisfaction, they are so durably constructed. No leaking of gas, pleasant heat, easily managed, economy in fuel, all these combine to make it the best Furnace to my knowledge in use.

ANDREW S. WAITT,

Supt. of Buildings, Harvard College.

Cambridge, Feb. 22, 1861.

Messrs. W. Bryant & Co.,—Gentlemen:

We are glad of the opportunity, to render our testimony in favor of your Furnaces. The one we had of you for the new Episcopal Church, on Broadway, works to our entire satisfaction. The building being high (about 50 feet), and open roofed, it was thought to be a matter of doubt whether one furnace would furnish sufficient heat for the coldest weather, and at the same time be adapted to furnish a low degree of heat in comparatively mild weather. But we speak from knowledge and experience when we say that it is perfectly adapted to furnish any degree of heat that may be required, that it is so constructed as to be very easily managed, emits no gas, and that the air is much more pleasant and pure than it is when heated by stoves. We, therefore, take great pleasure in recommending your Furnaces to all who want them for a purpose similar to our own.

Very truly,

THOMAS HILL, *Sec. of Trustees.*

Boston, Feb. 5, 1861.

Mr. Walter Bryant,—Sir:

The Furnace that you put into the Harvard Street Church a few weeks since, has given perfect satisfaction to the Standing Committee and Society, and I am satisfied that we get more heat from it than any other furnace we have ever had in the Church, and I take pleasure in saying that it accomplishes all your recommendations, and I would most cheerfully recommend it to all who want furnaces for churches, dwellings, or public buildings.

Respectfully yours,

ANSEL LOTHROP.

Boston, Sept. 1861.

Mr. Walter Bryant, Dear Sir:

Having used your Patent Hot Air Furnace, I take pleasure in bearing my testimony in its favor, and would cheerfully recommend it as being superior to any now in use, and where I have placed it in dwellings, it has given universal satisfaction.

Yours truly,

S. G. CHEEVER.

Boston, February 20th, 1860.

Messrs. Bryant & Co.,—Gentlemen:—

Agreeably to your request, I take pleasure in giving the result of the operation of the Furnace you put into my house. I have found it, by a thorough trial this winter, to be far superior to the one that was removed; and I have had a long experience, having built a great number of houses and tried a large number of Furnaces.

I can, therefore, with perfect confidence, recommend your Furnace to all those in want of one, as being the most efficient, most simple, and durable, of any that I have any knowledge of.

Respectfully yours,

JOHN HOWE.
House at the Corner of Washington Street and Ashland Place.

Dorchester, March, 1860.

Messrs. Bryant & Reed,—Gents:

The Furnace you put into the Church on Meeting House Hill, in this town, which I have the care of, operates better and gives more heat than any one I have ever seen or known. I have had charge of this house for several years, during which time we have had several different kinds of Furnaces, but none of them will compare with yours for simplicity, efficiency and economy.

I feel confident that all who try them, will be perfectly satisfied with their operation. The radiating surface is so large, and the castings so heavy, that it is unnecessary to heat them red hot, to obtain all the heat you want, rendering them more durable and easier managed.

WILLIAM DAVENPORT.

Boston, Feb. 18th, 1861.

Mr. Bryant,—Dear Sir:

The Furnace put into my house in Cambridge by you, has given the best of satisfaction; it heats up quickly, and although in a very exposed situation, my house, in the severest weather, has been warm throughout. I consider it the best Furnace now made.

Yours truly,

WILLIAM READ.

Messrs. Bryant & Co., 15 School Street, Boston,—Gents :

Boston, March 15th, 1861.

Agreeably to your request, I will give you and the public, my opinion of your Furnace. I have been for several years in the City Government, and we have always found great difficulty in properly heating and ventilating the public buildings, until we authorised you to place yours in the "High Street place School House," and it gives me great pleasure to be enabled to state that the trouble has been completely removed, as the heating and ventilating are perfectly satisfactory, and I can, therefore, with confidence, recommend to all who want a good and efficient heating apparatus, to select a furnace of your manufacture.

Yours respectfully, &c.,

CLEMENT WILLIS.

Mr. Editor:

I see the correspondents of the Journal and Herald are complaining about their hot air furnaces. If people are willing to try all sorts of experiments, by employing men without knowledge or experience in the business, they must expect to be duped; therefore I will give you my experience in hot air furnaces, and if it is of any benefit to anybody, I shall be gratified. Five or six years ago, when I built my house, I had a furnace put in, but it never worked satisfactorily. It did not give sufficient heat, it also leaked gas, and was very difficult to manage, and after trying it some time, I had it removed, and put in one invented by Walter Bryant. My house is large and high studded, being 30 by 60 feet; and from the 3d day of November to the 3d day of April, having a fire every day, I burned but five and a half tons of coal, and kept my house abundantly warm with pure warm air, not one particle of gas or smoke ever getting into the air chambers. I am satisfied that I can use it for 20 years without any repairs, except putting in a new pot occasionally; and I would also state that it is one of the easiest furnaces to manage that ever came under my notice. This furnace is for sale at No. 15 School Street, where any information may be had concerning it.

JAMES W. REED,

West Roxbury.

Mr. Walter Bryant,—Dear Sir :

Boston, July 27th, 1859.

I take pleasure in giving you a statement of the operation of the Furnace invented by you, and was put into the Bromfield Street Church about one year ago. We had for sometime used two Furnaces, which we found very difficult to heat the house with. I had to build the fires on Friday mornings, and drive them all I could until Sunday, to make the house comfortable for the Sabbath. We burnt 14 tons of coal a season. One year ago we had one of the Furnaces taken out, and one invented by you put in, and since that time have not had to build the fire until three o'clock Sunday morning, and I have heated the house sufficiently warm by church time; we keep a fire in the vestry all the time in a stove, and do not burn now but 10 tons of coal in a year. It is not half the trouble to take care of it that it was the one we had removed, and it has not cost one dollar to keep it in repair since it was put in. It is very easy to manage, and not one particle of gas or smoke gets into the air chamber. It is in every respect the best Furnace that ever came under my observation, and this Furnace gives as much heat as both the others.

Respectfully Yours,

MILTON DAGGETT,

Sexton Bromfield Street Church.

Messrs. Bryant & Co.,—Gents :

Boston, March 6th, 1860.

We, the undersigned, Teachers in the Hawes School, South Boston, are happy in being able to say, that the Furnaces now in use at this school, of your manufacture, have warmed the house to our perfect satisfaction, and that no other house in which we have taught, has been so comfortably warm and well ventilated, as this has been, since the introduction of your Furnaces.

Signed by seven Teachers of said School.

Messrs. Bryant & Co.,—Gents :

Boston, February 27th, 1860.

The Furnace you put into my house, has given perfect satisfaction. It has given me twice the amount of heat from the same amount of coal, that I had obtained from the one I had removed. When a truly meritorious article of this kind is presented for public use, I think it is the duty of those who have thoroughly tested them and know their value, to communicate publicly, the result of their experience, as there are so many poor Furnaces that have been forced into the market by parties having but little knowledge or experience in the business, causing more vexation and disappointment to the community (from the imperfect construction of such Furnaces) than is experienced from all other articles of domestic use.

I have built a large number of houses and tried many Furnaces, and feel a perfect confidence in recommending yours as being superior to any that I have any knowledge of.

Respectfully yours,

ALONZO DEXTER.

Messrs. Bryant & Co.,—Gents :

Jamaica Plain, February 24th, 1860.

I am very much pleased with the Furnace you put into my house. It is very simple in its construction, and easy to manage, and very economical, as the radiating surface is so large, that I get a plenty of pure warm air without heating any part of the Furnace red hot, and not a particle of gas gets into the air chamber.

I can recommend it to all those in want of an article of the kind. The castings are very heavy and it must be very durable.

Respectfully yours,

ARISTIDES TALBOT.

Boston, July 28th, 1860.

This may certify, that a Furnace invented by Walter Bryant, was put into the Bigelow School House, in the winter of 1855—6, to supply the place of one which had failed to furnish heat enough. This new Furnace gives good satisfaction. The rooms heated are on the lower floor, and therefore very hard to heat; but the object was accomplished with less fuel than had before been used ineffectually in a larger Furnace. The construction of the Furnace is so simple, that the joints are easily made perfectly tight with sand, no putty or cement being necessary. We have not been troubled with gas in this Furnace. The absence of lining also makes it heat up very rapidly.

JOSEPH HALE, Master Bigelow School.

Walter Bryant, Dear Sir :

Medford, July 28th, 1860.

I have great pleasure in recommending the Furnace of your invention, one of which I had put into my house about five years since. I have used it through four winters, and always found it to work perfect; I have over twenty years' experience in the use of Furnaces, but have never found one to compare with this. It has never leaked a particle of gas nor failed in any way, nor cost a dollar for repairs; simple in construction, easily managed, heats and radiates quick, and always works well. My house is built of wood, stands high and is exposed to all the cold winds. It is nearly 40 x 50 on the ground, and two stories high, and I have no trouble in keeping it perfectly warm during the coldest weather; in addition to heating my house, I have water for bathing. The Furnace gives full and entire satisfaction.

I am very respectfully yours,

GEORGE W. PORTER.

Lexington, Sept. 19, 1861.

Gents:

The Furnace set by you in the Unitarian Church in East Lexington, has given entire satisfaction, being very economical in the consumption of fuel, easily managed, and of great heating power. I consider it the best Furnace I have ever used or seen. Should I set a Furnace in my house this Fall (as I intend doing) I shall certainly give yours the preference.

Respectfully,

BILLINGS SMITH.

Boston, 1 Sept. 1859.

Mr. Walter Bryant—Sir:

Your Furnace was put into my house four or five years ago, and it has given, in all respects, perfect satisfaction. There is no smell of gas, its consumption of coal is moderate, and I have thus far been called to no expenditures for repairs upon it.

Were I to-day to put a furnace into a house, for my own occupancy, I should certainly, from my experience of yours and others, take yours.

Very respectfully yours,

HENRY J. GARDNER.

The following Gentlemen have them in use:

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 John J. May, Esq.
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 C. R. Lowell, Esq.
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 Andrew S. Waite, Superintendent of Harvard
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 Charles B. Hastings, East Cambridge.
 R. Sullivan, Jr., East Cambridge.
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 Henry D. Bassett,
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 R. Homer,
 Edward McAllister,
 J. T. Bartlett,
 Henry C. Nims,
 A. R. Browne,
 Old South (free) Church, Chamber Street.
 South Congregational Church, Union Park.
 Harvard Street Baptist Church
 St Mathew's Episcopal Church, South Boston.
 First Parish Church, Meeting House Hill, Dorchester.
 North Baptist Church, Dorchester.
 Unitarian Church, East Lexington.
 Methodist Episcopal Church, Newton Upper Falls.
 Congregational Church, Auburn, Maine.
 Old South Chapel, Spring Lane.
 Billings Smith, Esq., Lexington.
 Public Schools, Boston.
 " Cambridge.
 " Charlestown.
 " Dorchester.
 " Dedham.
 " Salem.

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15 SCHOOL STREET, BOSTON.

DIRECTIONS FOR USING.

In kindling the fire the damper in the smoke pipe should always be opened. Then put into the fire pot sufficient charcoal, bark or hard wood to ignite the coal. After the kindlings get well on fire, put on half a hod of hard coal, and after that is well ignited, add enough more coal to last through the day, the quantity depending upon the state of the weather. By a little experience the exact quantity will be learned. In mild weather when but little heat is wanted, a small hod full of coal will last all day. After it gets well on fire put two shovelfull of ashes over the fire, directly in the centre so as to leave a space around the sides of the pot to allow the gas and smoke to rise through. Turn the damper in the smoke pipe almost close, but leave it open just enough for the gas and smoke to escape. Draw out the stopper in the smoke pipe so as to admit the cold air of the cellar into it, which will regulate the draft so that the coal will never clinker. Then close the doors all tight and open the register in the feed door. Then you will have a moderate amount of steady heat all day without further trouble, if the draft is regulated right. As the weather becomes colder the amount of coal should be increased, and a little more draft left. When the proper size of our Furnace is adopted, and a little attention given to the quantity of coal used, and the regulation of the draft, it will be unnecessary to touch the furnace more than once a day in any weather, and the thermometer will not vary more than three degrees throughout the day.

If the head of the family will devote five minutes every morning after the fire is built to regulate the Furnace, a steady heat all day will be secured, and a large amount in fuel saved. If you desire to keep a fire all night, it will be necessary before retiring to shake out the ashes, replenish the coal and shut it up as before. A fire may be kept all the time without rekindling, if proper attention is given to the

management, so that the coal shall not melt down and form clinkers. These should never be allowed to form. When they are allowed to collect, the heat from the coal is much less, and it is much more trouble to manage the fire. The Furnace should be large enough, and with sufficient radiating surface to heat the house without becoming red hot or melting the coal. Care should always be taken to have the cold-air box open when the Furnace is in operation. There must always be a slide in it to shut off the cold air from out of doors in windy weather, and a door should be placed between the slide and the Furnace, which should always be open to take the cold air from the cellar, when the slide is closed. Very often, strong currents of air blowing by the outer end of the cold-air box, will form a vacancy and draw the hot air out of the box.

The harder kind of white ash coal should be selected for Furnace use.

DIRECTIONS FOR SETTING FURNACES.

Care should always be taken to set the Furnace as nearly as practicable under the center of the different apartments to be heated, so that the horizontal pipes shall be as short as possible. There is great loss of heat in passing the hot air through horizontal pipes. A good foundation should be laid so as to prevent the brick work from settling. The base should rest on a level with the cellar floor, where the cellar is of sufficient height to set it in that way. The space inside the base should be sunk about one foot for an ash pit. Two four-inch brick walls are built all around the furnace. The outer wall is nearly square, and the inner wall is circular, extending from the front all round the furnace, and within about four inches of the largest part of it. On the sides and one foot in the rear, at the bottom of the inner wall, a row of brick is set, endwise, far enough apart for one brick to run from one to another, thus leaving a row of port holes, all around the furnace, about six by eight inches in size, for the cold air to pass into the hot-air chamber. The inner wall is

carried up to from eight to twelve inches above the top of the furnace, and drawn in at the top from six to eight inches all around, commencing as soon as it is as high as the outer edge of the radiator. The outer wall is carried up, leaving a space of four inches on the outside, for the cold air to pass down to the opening into the hot-air chamber. A large man hole door is put either in the side or back of the furnace, where it is most convenient to get at. The bottom of it should be even with the bottom of the fire-pot. The space between the outer and inner wall all around the door should be bricked up so that the opening of the door will open to the hot-air chamber. A pier should be built up level with the bottom of the door to set the evaporating pan on. The outer wall should be continued, up to from four to eight inches above the inner wall, as the height of the cellar will admit. Then iron bars are put across from one wall to the other, far enough apart for a brick to reach from one to the other. Then one layer of bricks is placed flat-wise, so as to cover them over tight. The inner wall should be covered over with tin, or galvanized iron, upon the iron bars, and a layer of brick on top of that. Before the Furnace is covered over, all the hot air pipes and smoke pipes should be put in and bricked up tight through both walls. The hot-air pipes should be as equally divided around the air chamber as possible, and pass through the inner wall close up to the top covering. When it is necessary to take the hot-air pipe out of the top of the furnace, the bars must be far enough apart for the pipe to pass between them, and short bars used to cross from one to the other, for the bricks to rest on. Care should be taken that the end of the pipe does not pass below the under side of the inner covering, and the pipes must all be bricked round tight in both outer and inner wall. A tin casing, two inches longer than the smoke pipe, passes through the outer and inner wall, with a head on the outer end, with a hole through the center. It is large enough to fit the smoke pipe, so that the rise and fall of the furnace by expansion will not crack the brick work, which would occur if the smoke pipe was bricked solidly in it. Always bring the smoke pipe out of the side nearest the flue in the chimney.

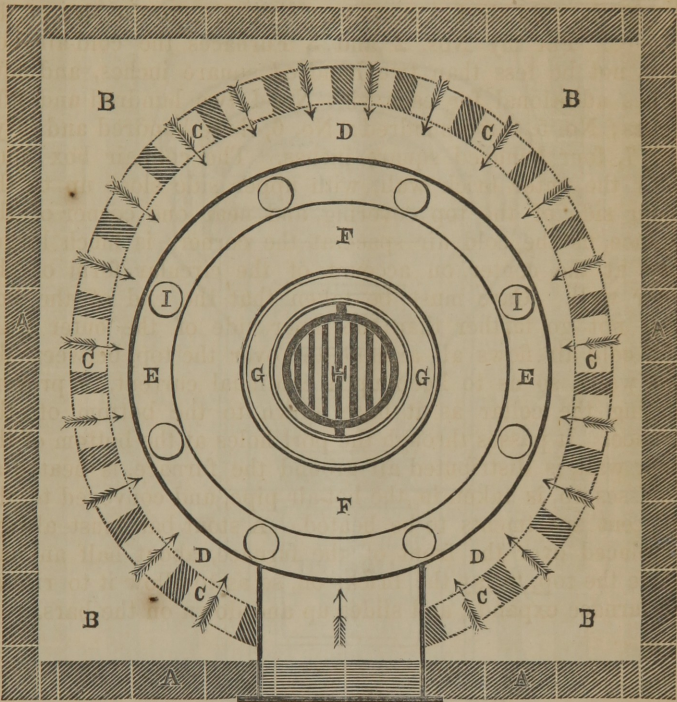
Cold air should always, when it can, be taken from the northerly side of the building, and care should be had to avoid taking it from a place where strong currents of air

will interfere with the regularity of the draft. A cold-air box should never be made without a slide to shut off the air from out doors, and a door between the slide and furnace, so that the air can be taken from the cellar in windy weather. The size of the cold-air box must vary according to the size of the furnace. For my Nos. 2 and 3 Furnaces the cold-air box must not be less than two hundred square inches, and fifty inches additional for each, viz: No. 4, two hundred and fifty inches; No. 5, three hundred; No. 6, three hundred and fifty; No. 7, four hundred square inches. The cold-air box must enter the outer brick wall, with upper side close up to the under side of the top covering, and near one corner of the furnace, as the cold air space at the corners is much larger than at the center, on account of the circular form of the inner wall. Care must be taken that the end of the box does not go farther than the inner side of the outer wall. The cold air flows all around and over the top, between the two walls, so as to keep up a continual current, to prevent heating the cellar as it flows down to the bottom of the furnace. It passes through the port holes at the bottom of the inner wall, is distributed all around the furnace, is heated as it passes up, is taken in the hot-air pipe, and conveyed to the different apartments to be heated. A stout bar must always be placed over the front of the furnace, about half an inch above the top, to lay the bricks on, so as to allow it to rise as the furnace expands, and slides up and down on the bars.

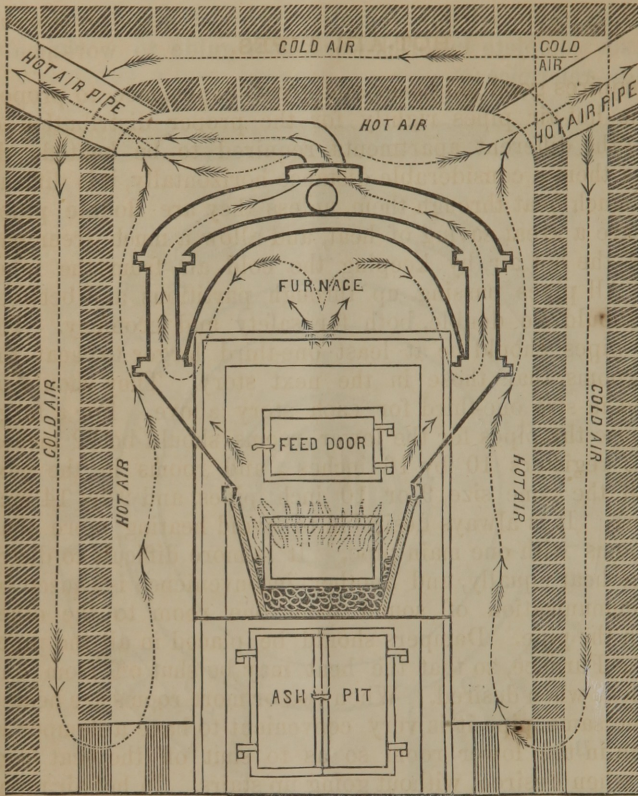
PACKING.

In putting the Furnace together, care should be taken that every joint is carefully packed with a fire-proof cement which we always furnish. When you put the pot on to the base, bed it in mortar, and where the mouth-piece sets on to the top of the pot, it should be packed with cement or mortar. All the grooves must be filled about half full of cement, and then filled up with sand, and when put together, all the edges worked down to a bearing, and the flange round the feed door should be filled with cement before the front is fitted on.

The engravings below represent two sections of my Furnace when set complete in brick-work, as a guide to workmen in setting—reference:—



- A A A represent the outer brick wall, 4 inches thick.
 B B B, the cold-air space between the outer and inner walls.
 C C C represent the port holes at the bottom of the inner wall where the cold air passes to hot air chamber.
 D D D, the hot air chamber.
 E E E, the rim or largest part of the Furnace.
 F F F, inside of the Furnace.
 G G G, the Furnace pot.
 H, Furnace grate.
 I I I, columns through which smoke and gas pass.



SIZE OF BRICK-WORK.

For No. 2 & 3 Furnace, 5 ft. 4 in. square on outside of wall.

No. 4, 5 ft. 10 in. square outside.

No. 5, 6, & 7, 6 ft. 2 in. wide, 6 ft. deep.

The inside of all the walls should be plastered smooth, and by referring to the two cuts, no one can fail to understand the construction of the Furnace and brick-work.

My Portable Furnaces are constructed upon the same plan of those set in brick, the only difference being one inch inclosed in iron and tin casing, and the other in brick. I have six sizes of the Portable, prices varying from thirty-five dollars to one hundred. My largest size Portable, designed for public buildings or large stores, is one-third larger than any in the market.

HOT-AIR PIPES.

It requires good judgment and great experience to proportion the hot-air pipes rightly for the proper distribution of heat to the different apartments required to be heated. In running them a considerable distance horizontally, it is difficult to get much heat through them, unless they are double pipes, which are a great saving of heat, and allow a much freer passage of the hot air, by keeping the cold air from the inner pipe. All pipes passing up through partitions and between floors should be double, both for safety and economy. The hot-air pipes should be at least one-third larger to heat the lower rooms, than those in the next story. They should be reduced in size one-third for each story above. For a large size house the pipes for the lower rooms should be 12 inches, and the registers 10 by 16 inches ; and rooms in the next story, if the same size, 9 or 10 inch pipes, and 9 by 14 inch registers. It is always desirable to avoid heating more than two rooms with one main pipe. It is more difficult to distribute the heat equally, and another inconvenience is caused by the communication of sound from one room to the other through the pipe. Dampers should be placed in all the pipes near the Furnace, so that the heat may be shut off from any apartment when desired. When two or more rooms are heated from the same pipe it is very convenient to have a damper in the pipe in the lower room so as to shut off the heat from above, when desired, without going up stairs. In hot-air pipes leading from the Furnace to the flues or registers, there should be as much elevation as possible, as the air passes much freer than if they are horizontal.

The inside of the hot-air chamber should be plastered smoothly, and both walls of the cold-air chamber inside, the covering of the inner wall on top, and the outer or top covering. The top covering may be covered within two inches of the ceiling, or top of the cellar, with perfect safety, as the cold air, flowing between the two coverings prevents the upper part from heating but very little.

We have had our engraving made representing a section of our Furnace with brick work, showing the Furnace, hot and cold air chambers, hot-air pipes, and cold-air box, with references, as a guide to the workmen in setting.

HEATING CHURCHES AND PUBLIC BUILDINGS.

Where only one or two Furnaces are required, they should always be placed near the front entrance, as the cold air, rushing in at the doors, will force the hot air into the back part of the building, thus equalizing the heat. It is always necessary to have the cold air taken in a box from the part of the building farthest from the hot-air register, and conducted into the top of the hot-air chamber. By taking the cold-air from the building to supply the Furnace, it is much more easily heated, as the hot air always rises to the top of the room, and by drawing cold air from the floor, the hot air is drawn down lower. A cold-air box should also be taken from outside of the building and let into the air chamber so as to admit the air from outside after the audience has assembled. There should be a slide in each box so as to shut one when the other is open.

Place the Furnace directly under where the heat comes into the building. Where only one room is to be heated it is much better to use one large grate or register, than two, as a loss of heat would be occasioned by running two horizontal pipes to two registers. When only one opening for hot air is used, a grating should be placed over it, and it should never be closed while the Furnace is in use. The inner wall of the brick work for the hot-air chamber should also be drawn in at the top to the size of the grate, and a tin pipe, with a flange thrown off, the size of the grate, built into the brick work, pass up through the stone that the grate is fitted to, and a flange thrown off at the top for the grate to rest on.

A tin casing two inches larger than the hot-air pipe, should always run up through the floor, to the under side of the stone supporting the grate or register, leaving one inch space around the hot-air for free circulation of air, to prevent danger from fire.

When a large size furnace is used, with only one opening for hot air, it should not be less than thirty inches in diameter with a stone having a margin outside of the grate of not less than four inches; a wire netting should be placed in the hot-air pipes under the grate, to prevent anything from dropping down into the hot-air chamber.

VENTILATION.

Good ventilation is a very important object to be attained in public as well as private buildings, and in experimenting for this purpose, large sums of money have been expended to very little advantage, when, by adopting a very simple and practical plan, perfect ventilation can be had at a small expense. It is of very little use to make openings into cold flues to ventilate a room. If an opening is made from the top of the room into a flue, in cold weather, instead of ventilating it you carry off the pure warm air, while the impure, vitiated air falls to the bottom of the room. You will always find the top of the room hotter than the lower part, whether heated by a furnace or a stove. Therefore where any artificial heat is required, by having ventilating openings at the top of the room you are only exhausting the heat without removing the foul air.

My plan for ventilating either public or private buildings, is as follows:—

If the building is of brick, I have a large flue, say about sixteen or eighteen inches square, built from the cellar to the top of the building as high as the chimneys go. It may be built in the chimney stack, or, where a sufficient space can be spared, between the rooms. Where space cannot be spared otherwise, I run a tin pipe, say from 14 to 16 inches, up through the closets or any other available space, to the top of the building, carrying through the roof, with galvanized iron or a brick chimney on the outside. Then I run a cast iron smoke pipe inside of the tin pipe, from the cellar out to the top of the building, on which a ventilator is placed, the cast iron pipe passing up to the opening in the ventilator under the cap. The smoke pipe passing through the center of the ventilating flue, leaves a very hot chamber around it from top to bottom, as the pipe from the Furnace is let into it. Thus, when in use it creates a very strong current from the cellar to the top of the building. I then place a small register in the room, wherever it will be most out of the way, keeping, however, at a considerable distance from where the heat enters the room. It may be under any piece of furniture which is raised three or four inches from the floor, and may always be kept open without any waste of heat. I then connect a pipe, either of tin or wood, to the register, between the floors, and run it to the ventilating flue surrounding the smoke pipe. Where the

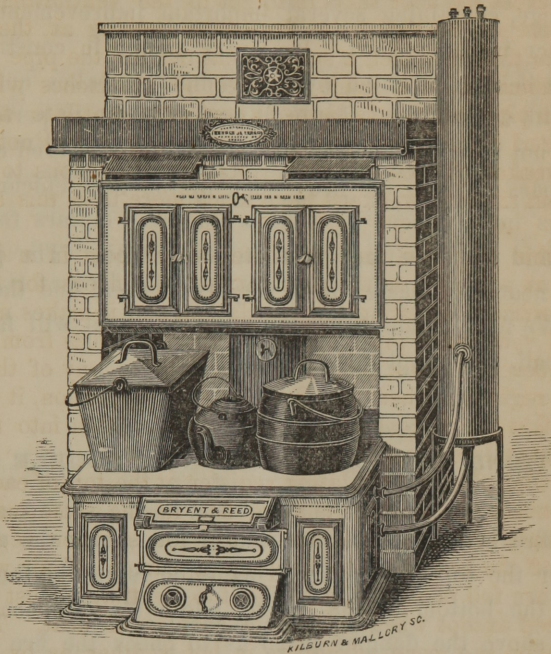
floor timbers run parallel to each other from the register to the flue, the pipe can be placed between them; but when the pipe has to cross the floor timbers to get to the ventilating flue, it runs between the timbers as far as the bearing at the end of the floor timbers; then a space is cut out for the pipe to cross the timbers in. A space of three by six inches wide will admit a pipe sufficiently large to perfectly ventilate any common sized room in a dwelling house, and this will not in the least weaken the floor timbers. Making the tenons to fit into the main timbers, weakens them much more than this arrangement.

In this way you may ventilate every room in a dwelling house, as you can run the pipe between the floors for any distance, without checking the ventilation, and it makes no difference if ventilating pipes are connected with flues from four or five different stories. By placing a light to any of the ventilating registers, when the Furnace is in operation, it will be found that the current will draw the blaze down into the flue, and instantly extinguish the light.

We also place a ventilating register at the top of each room and connect the pipe to the same flue, in the same manner as with those below. These are to use for summer ventilation, to let off the heat, and to keep up a current of air when the rooms are full of company. The top ventilator must always be closed except when there is a surplus of heat. The top ventilation is a great advantage in hot weather, as by opening a space from the cellar into the ventilating flue, the cold air rushes up very rapidly to the top of the building; and by keeping both ventilators open, a strong current of air can be kept up continually.

Every kind of public and private buildings can be perfectly ventilated in this manner, both in summer and winter; and in winter the rooms are freed not only of the foulest but of the coldest air.

COOKING RANGES.



As the Cooking Range is one of the most important articles in domestic use, I have given great attention to the construction of my new Double Oven Cooking Range. Being familiar with all the ranges in the market I have been able to avoid most of the objectionable features of the other styles, and to make this much more simple and easier to manage. No person can fail to understand its operation. The castings are much heavier than those of most other ranges, and much more durable. This Range has also great recommendations for economy and other desirable characteristics. The ovens are placed directly over the fire, and flues conduct the heat all around them in such a manner as to affect them equally in every part. The heat is also applied so directly, that it requires but a very small fire to operate them.

All those who want a perfect Cooking Apparatus, are invited to call and examine Bryant's New Double Oven Cooking Range, containing several important improvements over any other in the market. It is very simple in construction, the heat being controlled by one damper, it bakes quick and even, with a small fire; the broiling apparatus is perfect, the meat is not smoked or burnt, the juice is all preserved and the fumes pass off into the fire; some of the best epicures say that this improvement is worth a hundred dollars to every Range, and to all that appreciate a good steak. The pattern is very neat and chaste; it is very economical and the price low. We feel confident that those in want, who will favor us with a call, will adopt this pattern.

DIRECTIONS FOR USING BRYENT'S DOUBLE OVEN COOKING RANGE.

The fire is kindled in the usual way. Draw the damper out over the top of the ovens, open the valves in the front, fire at the bottom of the range, and after the coal gets ignited shove the damper in so as to check the fire just as much as is necessary to regulate the heat, as you want; when the fire is low and you want to use but one oven, turn the valve in the centre flue leading from the top of range to bottom of oven so as to throw all the heat under one oven.

After you have done using the range, shove the top damper very nearly close, just leaving draft enough to keep the fire alive; and when you want to clean out the range for a new fire, close up the valves in the bottom of the range, and use the crank outside of range to turn the grate over, which can be done without letting a particle of ashes or dust into the room. To carry off the smell from anything cooking, open the valve under the mantel at the top of the range, and as opening this always checks the draft, it is well always to close it when you want to bake quick.

For broiling, drop the front plate and open the small doors at top of grate, and use a double wire gridiron, fitted to a tin reflector, which saves all the juice of the meat and leaves all smell into the fire, and will not smoke or burn it.. When the fire is very low, the same gridiron may be used over the fire, putting it through the space opened by the narrow doors top of the grate.

For roasting, remove the front, drop plate and bottom fender, and open the small doors top of grate, place the kitchen close up to the range, which should be fitted to it, and you can roast as well as by an open fire.

COAL TO BE USED.

Small sized or nut white ash coal is much the best to use in a range, as it makes a more intense heat and will not clinker up, and will last much longer than the red ash coal, and less trouble to take care of it.

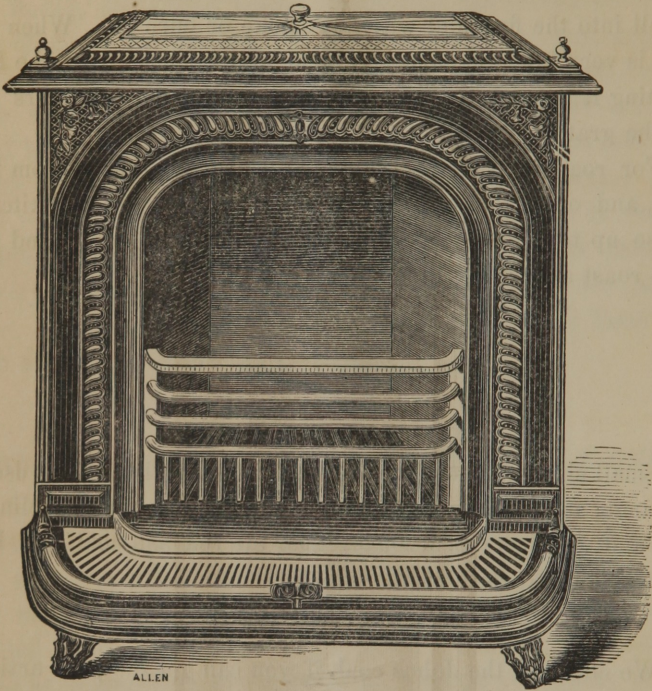
WHITE ASH COAL.

We consider the Johns coal, if you can get the pure article, fully equal to any in the market. Also the Lehigh is very good for furnaces, and Locus Mountain is very good for small size furnaces or ranges; also Broad Mountain or Ashland.

RED ASH COAL.

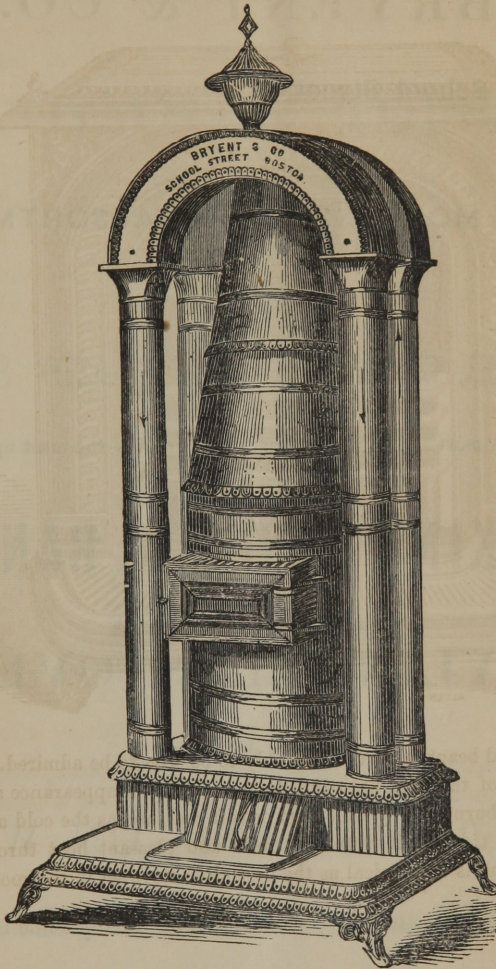
The most popular names are Pink Ash, Peach Mountain, Locust Vein, Diamond Vein; although not much dependence can be made on the name, as a large amount of the coal is shipped under the most popular name. The surest way to get the best coal is to buy it of those you can depend upon, and if they don't send you the right kind, make them change it.

HOT AIR RADIATING PARLOR GRATE.



This new and beautiful Grate has only to be seen to be admired. It has the advantage of the most beautiful Parlor Grate, in appearance and compactness, will burn equally well hard or soft coal, and as the cold air passes entirely round the fire, it diffuses a mild and pleasant heat through the entire room, and is economical as the best close stove set in the room.

This fire was found by Mr. Allen, who has been for many years engaged in the manufacture of grates, and has been the result of long and careful study. It is so arranged that the cold air passes round the fire, and is thus heated, and diffuses a mild and pleasant heat through the entire room. It is also so arranged that the fire burns equally well on hard or soft coal, and is economical as the best close stove set in the room.

BRYENT'S PATENT ARCH RADIATING STOVE.

This Stove was invented by Walter Bryent, whose long experience in manufacturing Heating Apparatus, has enabled him to construct a Stove which, for beauty, simplicity and economy, far excels any stove ever offered to the public, which every one who has seen it will testify. It is so simple in its construction that any one can see its advantages; the heat is conducted through the base near the floor, making it very convenient for warming feet and diffusing the heat into every part of the room, and exposing twenty-five per cent. more radiating surface than any other stove. We manufacture a great number of sizes expressly adapted for heating churches, school rooms, stores and Offices, and we feel confident that all who examine it will appreciate its merits. It is so constructed that the draught is so easily managed that a fire may be kept for weeks without clearing out or rebuilding.

BRYENT & CO.,

No. 15 School Street, - - - - Boston.

HAVE

THE MOST EXTENSIVE ASSORTMENT

OF

PARLOR, CHAMBER GRATES AND STOVES

Of the most approved patterns, together with the most approved

COOKING STOVES, RANGES,

CYLINDER STOVES,

And every description of

SHEET IRON AND TIN WORK,

With a great variety of other articles usually found in a

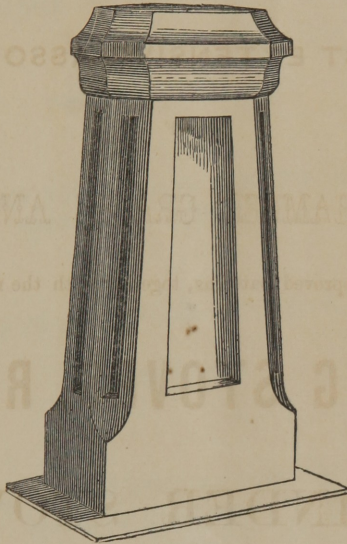
STOVE STORE.

The stock is entirely new and selected with great care, by those who have had a long experience in the business.

A NEW AND BEAUTIFUL DESIGN

—FOR—

CHIMNEY TOPS,



Which when placed on top of the Chimney, makes a beautiful finish, preserves the top of the Chimney, and greatly improves the draught. Also,

BRYENT'S

NEW AND USEFUL COAL SIFTER.

The cheapest and best sifter ever introduced.

We also Manufacture the most Approved Ventilators.

Call and examine our stock before purchasing elsewhere.

BRYENT & CO.,

No. 15 School Street, Boston.

