(No Model.)

8 Sheets—Sheet 1.

E. LOFTS.

RANGE.

No. 422,426. Patented Mar. 4, 1890.

Fig. 1.

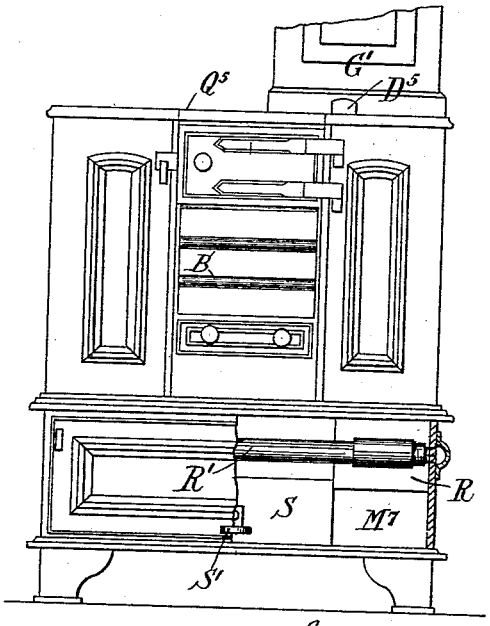
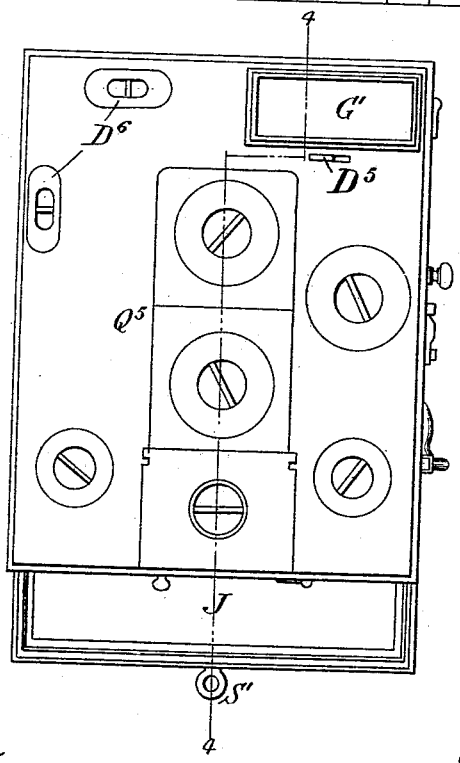


Fig. 3.



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(No Model.) 8 Sheets—Sheet 2.

E. LOFTS.

RANGE.

No. 422,426. Patented Mar. 4, 1890.

Fig. 2.

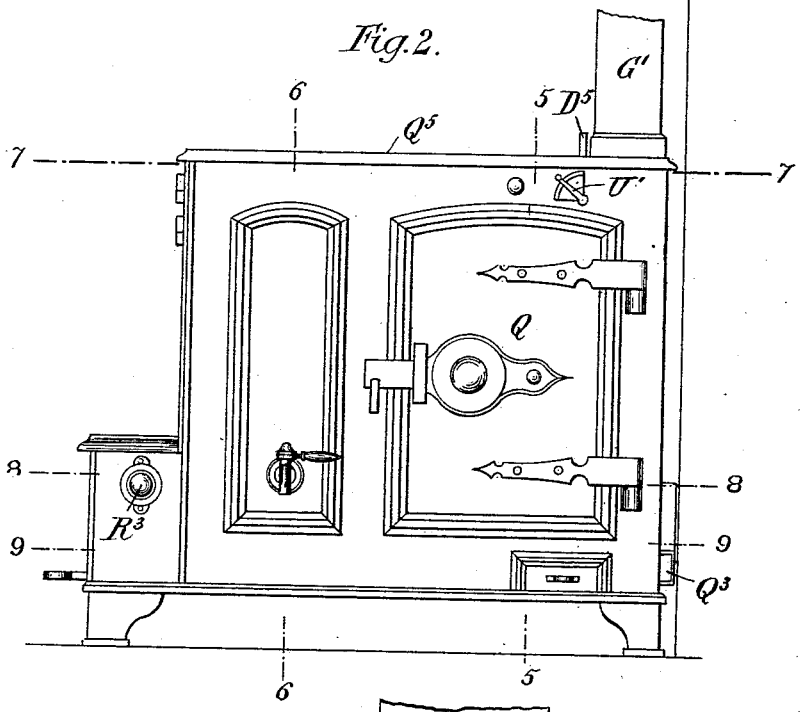
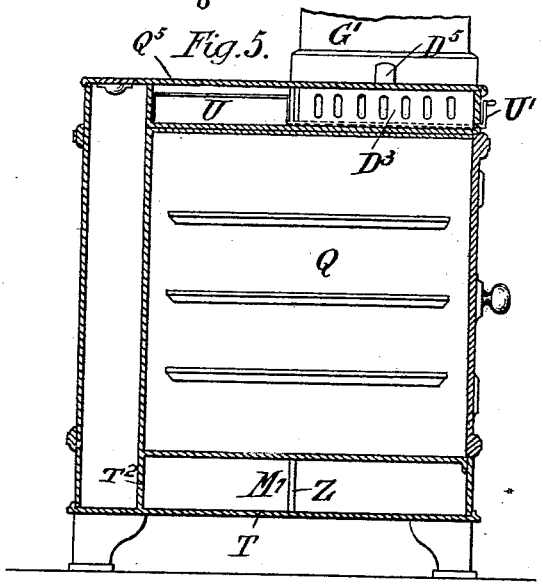


Fig. 5.



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(No Model.) 8 Sheets—Sheet 3.

E. LOFTS.

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No. 422,426. Patented Mar. 4, 1890.

Fig. 4.

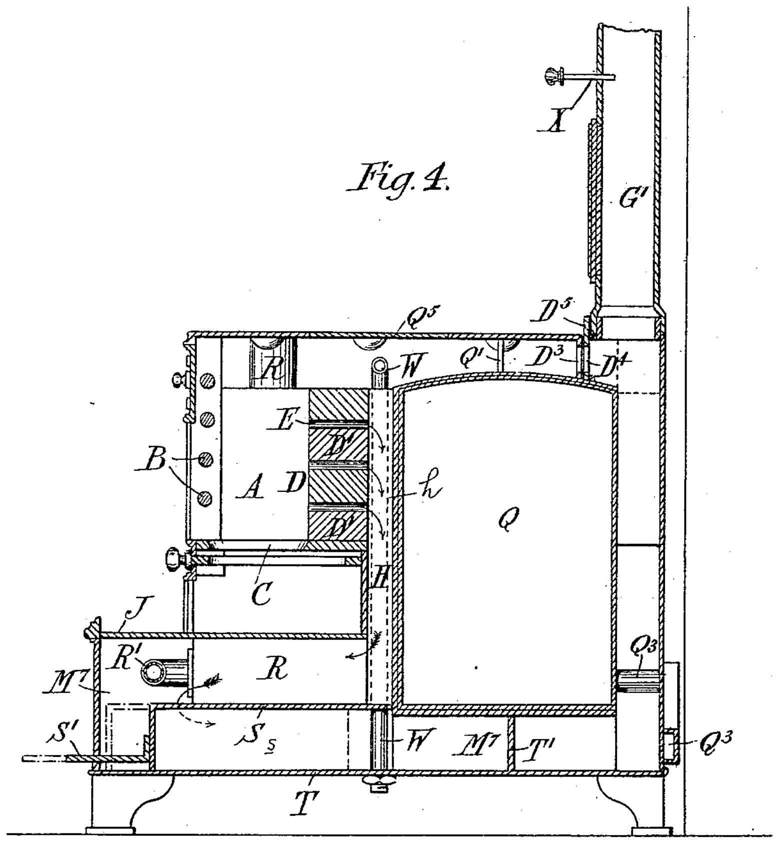
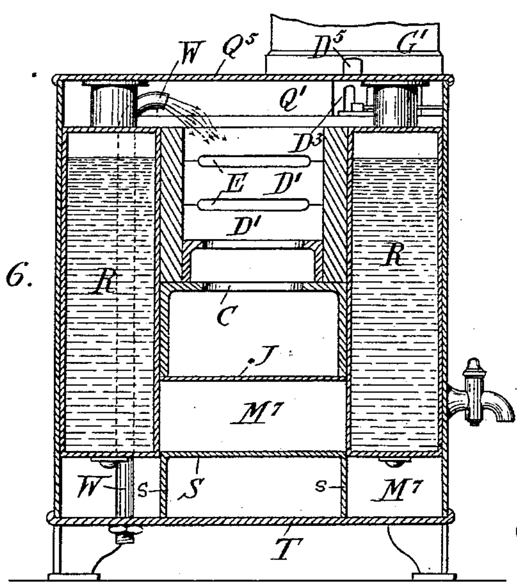


Fig. 6.



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8 Sheets—Sheet 4.

E. LOFTS.

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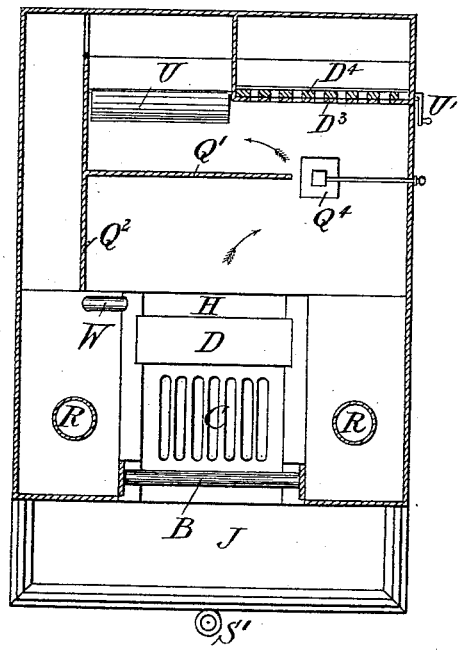
No. 422,426. Patented Mar. 4, 1890.

Fig. 7.



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(No Model.) 8 Sheets—Sheet 5.

E. LOFTS

RANGE.

No. 422,426. Patented Mar. 4, 1890.

Fig. 8

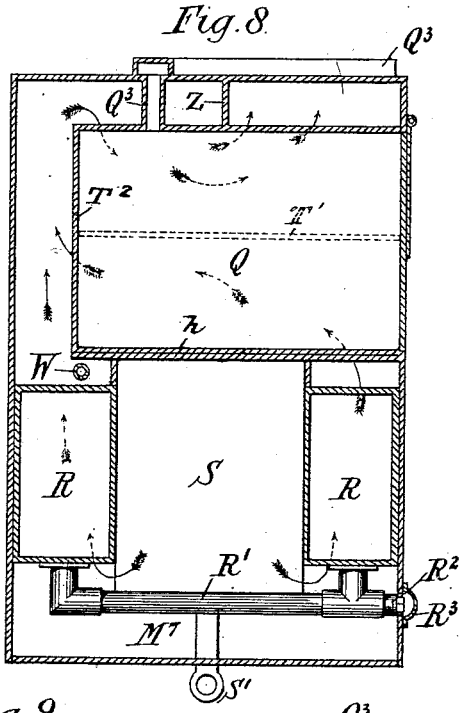
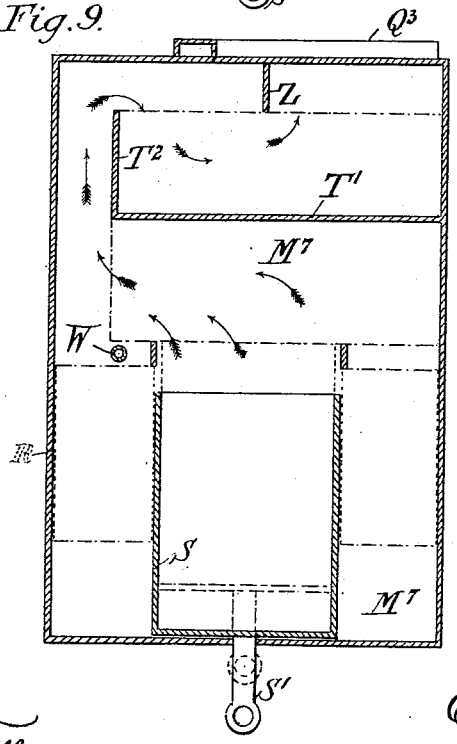


Fig. 9.



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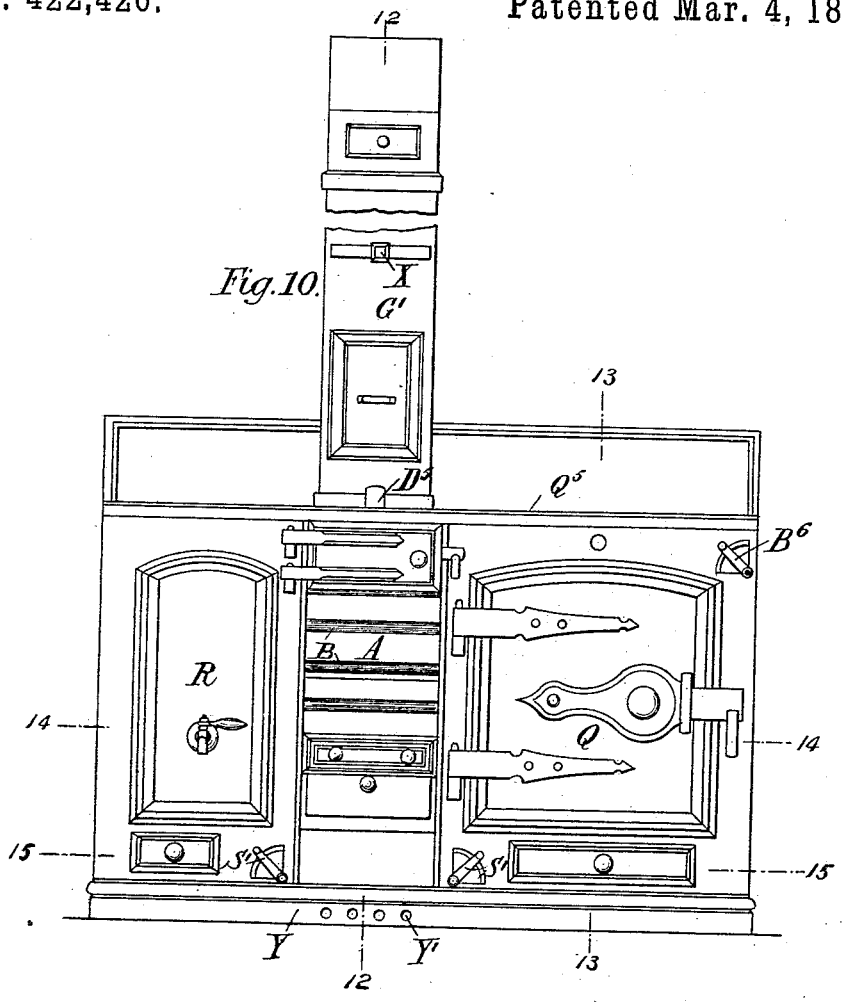
RANGE.

No. 422,426. Patented Mar. 4, 1890.

Fig. 10.



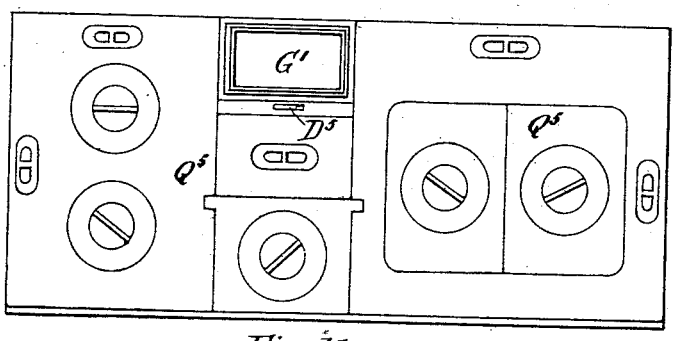


Fig. 11.

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No. 422,426. Patented Mar. 4, 1890.

Fig. 12.

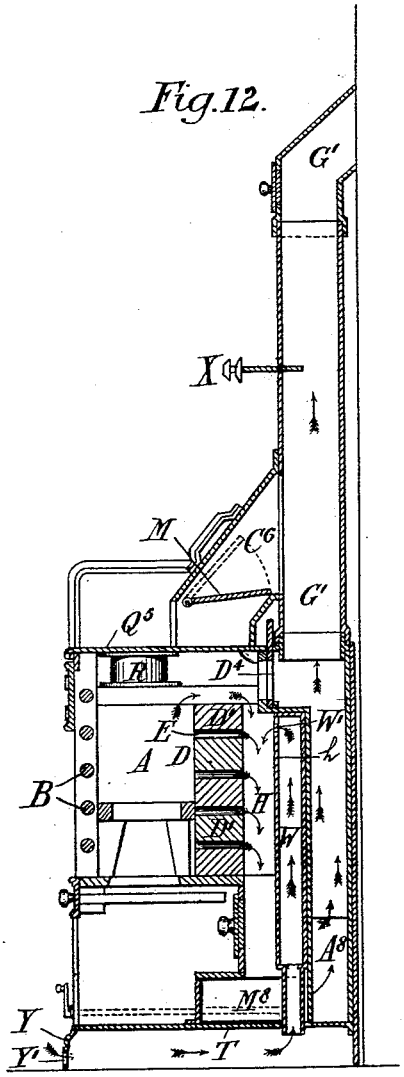
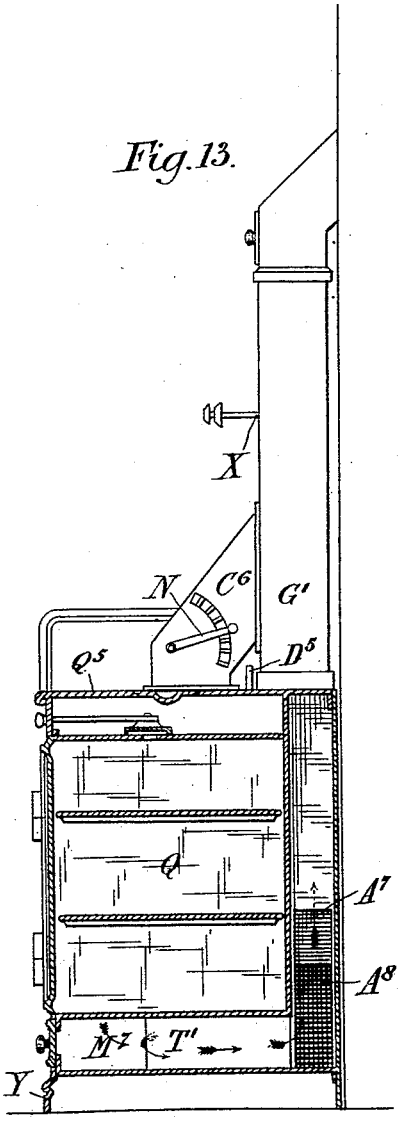


Fig. 13.



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RANGE.

No. 422,426. Patented Mar. 4, 1890.

Fig. 14.

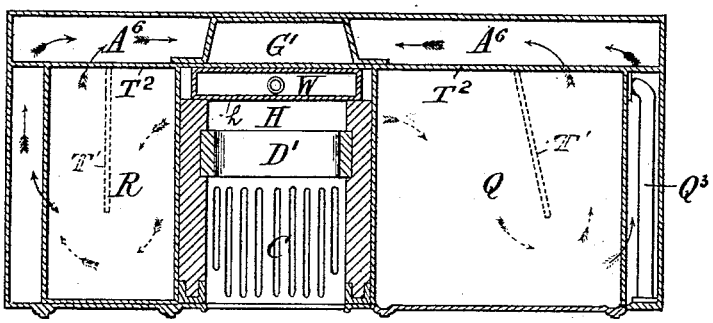
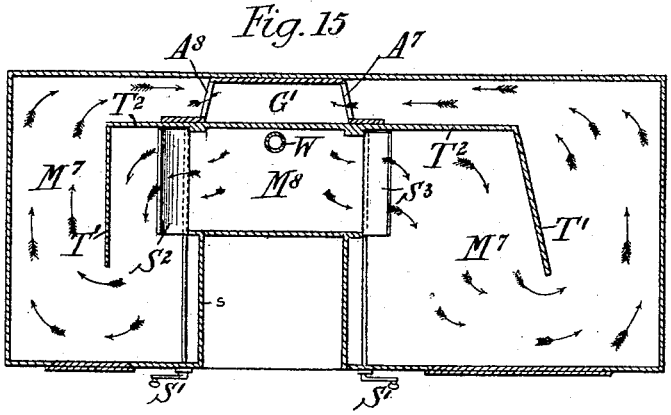


Fig. 15



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UNITED STATES PATENT OFFICE.

EZRA LOFTS, OF CAMBRIDGE, ENGLAND.

RANGE.

SPECIFICATION forming part of Letters Patent No. 422,426, dated March 4, 1890.

Application filed January 31, 1889. Serial No. 298,218. (No model.) Patented in England March 5, 1888, No. 3,385.

To all whom it may concern:

Be it known that I, EZRA LOFTS, a subject of the Queen of England, residing at Cambridge, in England, have invented certain new and useful Improvements in Ranges and the Like, (for which I have made application for Letters Patent of Great Britain, No. 3,385, bearing date the 5th day of March, 1888,) of which the following is a specification.

This invention, while applicable to other ranges, &c., of a similar character, is especially designed to improve my own well-known ranges, &c., and I will describe it in reference to these. I find by experience that the combustion is sometimes so rapid, especially with a chimney having a naturally strong draft, that the back plate of the range is apt to get burned out, with the additional disadvantages of consuming the fuel too quickly and not sufficiently heating the incoming fresh air. I get over these difficulties and improve the construction of the range, &c., in the following manner:

In my former ranges the back plate was made with a number of vertical slots or openings through which the flames passed to the combustion-chamber and hot plate. This back plate was made thin—about three-quarters of an inch. I now make this plate thick, preferably three or four inches, and place the slots or openings horizontally, by which I get a better sheet of flame, and so more effectually consume the smoke. The former plates were made of cast-iron or fire-clay in one piece, so that when part of it was spoiled the whole plate required to be renewed. I now generally make it of a number of slabs or pieces, preferably of the same materials as before, recessing the edge or face of such as may be necessary, so as to produce the slots or openings, which may be half in each of two contiguous pieces or entirely in one of them. If part of a back thus formed be spoiled, it can be easily replaced, the remaining pieces being still fit for use. I find a back thus formed will last far longer than those formerly used by me; but it is necessary to still further control the draft, or the enormous heat generated will melt or destroy even these backs. In this improved construction I can, if desirable, place the oven on one side of the fire and the boiler on the other, or the oven may be at the back and the boiler at one or both sides of the fire.

In the accompanying drawings, Figures 1, 2, and 3 are respectively a front elevation, a side elevation, and a plan of an independent or self-contained cooking-range constructed according to my invention, and of which Figs. 4, 5, and 6 are vertical sections taken, respectively, on the lines 4 4, Fig. 3, and 5 5 and 6 6 of Fig. 2, and Figs. 7, 8, and 9 horizontal sections taken, respectively, on the lines 7 7, 8 8, and 9 9 of Fig. 2. Figs. 10 and 11 are respectively a front elevation and a plan of one of my improved cooking-ranges adapted to be built into a wall-recess, although the construction is such that it may be worked as an independent and self-contained range, and of which Figs. 12 and 13 are vertical sections, and Figs. 14 and 15 horizontal sections, all taken, respectively, on the lines 12 12, 13 13, 14 14, and 15 15 of Fig. 10.

Like letters indicate like parts throughout the drawings.

A is the fire-place, which, as shown, is provided with ordinary fire-bars B and grate C.

D is the back plate, which I construct of a number of parts D′, each having formed in it either a complete horizontal opening E or, as shown in the drawings, one or two recesses, which, together with similar recesses of other parts, will form one or two such openings E, such a construction admitting of those portions of the back which may have become burned or otherwise destroyed being removed and other whole portions substituted therefor. The openings E communicate with the combustion-chamber H, situated between the said back and the hot plate *h*.

R is the boiler, which is constructed in two parts arranged at different sides of the fire-place, as shown, and connected together at the lower parts by the pipe R′, which, for cleaning purposes, is preferably provided with a removable plug R^2, to which access is had by the removal of the cap R^3, fastened on the range-casing.

S is a damper, shaped like an inverted shovel, having at its edges the downward-projecting portions *s s*, which form longitudinal partitions dividing the forward part of the chamber M^7, and which is capable of being moved by means of the handle S′ from the in-

ner position in which it is indicated in Fig. 4 in full lines into that shown by dot and dash lines. In Fig. 9 these positions are indicated in the reverse manner, the dot and dash lines indicating its inner position and the full lines its outer position.

It will be seen more clearly by reference to Fig. 6 that the hearth-plate J, the inner walls of the two parts of the boiler R, and the damper S, when in its inner position, form a flue which leads from the lower part of the combustion-chamber H to the front part of the chamber M^7, so that the products of combustion directed downward through the combustion-chamber H are caused to travel forward over the damper S and divide and turn under the two parts of the boiler R when passing to the outlet flue or chimney G′.

The part of the chamber M^7 between the oven Q and bottom plate T is partitioned off by plates T′ and T^2, as indicated clearly in Fig. 9, so as to cause the products of combustion, as indicated by the arrows, to pass first in one direction at one side and then in the opposite direction at the other side of the plate partition T′ T^2 before they finally reach the entrance to the outlet-flue G′, which entrance, it is to be observed, is on the same level as the chamber M^7.

The flue-space between the top of the oven Q and the top plate Q^5 is partitioned off by the plates Q′ Q^2, and the back of this space is closed in partly by the hinged valve or damper U (which may be opened or closed from the outside of the range by the handle U′, Fig. 2) and partly by the hit-and-miss damper D^4, the handle D^5 of the movable portion of which projects upward through a slot in the hot plate Q^5 to enable it to be operated from the outside.

W is a pipe the lower end of which projects through the bottom plate T, as shown in Figs. 4 and 6, and passes up through a space between one part of the boiler R and the oven Q, which space, as also the corresponding one at the opposite side of the fire-place, is closed in at its upper part by, as it were, a continuation of the top plate of the boiler. The upper end of the pipe W is bent over, so that the heated air discharged from it is directed into the combustion-chamber H to more effectually consume the gases as they leave the fire-place A.

Q^3 are passages for conducting fresh air into the oven Q, which in the usual manner is provided with the ventilator Q^4.

In Fig. 6 I have shown a false bottom applied to the fire-grate; but when a large—say roasting—fire is required that may be removed.

When kindling a fire in the before-described range, the hit-and-miss damper D^4 and the damper X are opened, and, all the others being closed, most of the fire-gases will then with the full draft be drawn directly to the chimney G′, so that the fire will soon be well ablaze. Suppose, now that the fire has "drawn up," it is desired to apply the full heating powers to the boiler R. For this purpose the hit-and-miss damper D^4 is closed, and the damper S being in its closed position—that is to say, pushed in to the fullest extent—the fire-gases will pass through the slots E into and down through the combustion-chamber H, whence they travel forward between the two parts of the boiler R, as indicated by the arrows, Fig. 4. Then they divide and pass under the said two parts of boiler, as indicated by arrows in Fig. 8, which, with the arrows shown in Fig. 9, trace the course they pursue before finally reaching the lower entrance to the escape-flue G′. It will be seen that the escaping fire-gases thus conducted are brought considerably in contact with the bottom of the oven Q; but suppose it be desired to apply the maximum heating powers to the bottom of the oven Q instead of to the boiler R. The damper S is drawn outward into the position indicated in dotted lines in Fig. 4, and the escaping fire-gases will then pass over the back or inner edge of the said damper S and, as indicated by the arrows in Fig. 9, directly to the under side of the oven Q, whence they travel first to the left in front of the transverse partition-plate T′, then rearward past the longitudinal partition-plate T^2, thence to the right at the back of the plate T′, and finally entering the escape flue or chimney at the lower part, as represented by the arrows shown in Figs. 8 and 9. If, instead of applying to the oven "bottom heat," as herein last described, it be desired to apply "top heat," the damper S is closed and the damper U opened by means of the handle U′. The products of combustion by this adjustment will then, as indicated by the arrows in Fig. 7, be drawn across the top of the oven first to the right and then to the left, pass through the open damper U down at the back and under the rear part of the oven, and thence around the plate Z, Fig. 9, to the chimney G′.

The air passing into the lower end of the tube W becomes heated in its upward passage, and is therefore discharged in a highly-heated condition into and among the fire-gases immediately after they leave the fire-place, so that the combustion of the said gases is rendered almost complete. The air entering the oven Q through the passage Q^3 is similarly heated by contact with the back wall of the range.

It is to be observed, although the working of the range has been described with the fire-gases passing in one particular direction or another, that by suitable manipulation of the valves the said fire-gases may be caused to travel some in one direction and some in other direction or directions.

The hearth or top plate J of the chamber M^7 is well adapted for keeping plates, dishes, and the like hot.

The range represented in Figs. 10 to 15 of the accompanying drawings is of a construc-

tion specially adapted for being built into a recess in a wall, though it can also, if desired, be arranged against the face of a wall. In this range the oven Q is situated at one side and the boiler R at the other side of the fire-place, at the back of which is arranged the combustion-chamber H, as in the preceding example. At the back of this combustion-chamber is the hot-air pipe or chamber W, which opens at its lower end below the bottom plate T and behind the skirting Y, this being perforated at Y′ to admit the air, which afterward passes up into and becomes heated in the said chamber W and is afterward discharged therefrom through the perforations W′, as shown by the arrows in Fig. 12. The lower part of the combustion-chamber H opens into the chamber M^7, the only outlets from which are by way of the hinged valves or doors S^2 and S^3, which may be opened or closed from the outside of the range by means of the handles S′.

T′ and T^2 are plates which so divide the flues M^7 beneath the oven Q and boiler R as by deflecting the course of the fire-gases to cause them to give off more of their heat to the said oven and boiler by holding them longer in contact with the surfaces of such parts.

A^6, Fig. 14, are the flues at the back of the oven and boiler, which connect with the outlet-flue G′ by the openings A^7 and A^8, the former—viz., that leading from the back of the oven Q—being preferably larger than that from the boiler R, as shown in Fig. 13, so as to induce more of the fire-gases to pass around the oven than around the boiler.

B^6 is the handle of a hinged damper, not itself shown in the drawings, but which, when opened, causes the fire-gases to be drawn over the top of the oven. This damper for convenience is herein referred to by the letter B^6, applied to its handle.

C^6, Figs. 12 and 13, is a movable hood, by the application of which the removal of parts of the top plate Q^5 converts the range from a "close-fire" to an "open-fire." This hood, as shown in Fig. 12, is provided with a damper M, which may be operated by the handle N in such manner that the range, although having the hood applied and in operation as an open-fire range, may, by the closing of the damper M and opening of, say, the damper D^4, be worked as a close range.

When in the last-described range it is desired to kindle a fire, the hinged dampers S^2 and S^3 are preferably closed and the sliding damper D^4, Fig. 12, opened, it being of course understood that the damper X must be more or less open at all times, except when there is no fire in the range. The fire by so adjusting the dampers will speedily be drawn up as the draft conducts the gases directly to the chimney G′ through the damper D^4. Now, supposing that after the fire is well ablaze it is desired to apply the full heating powers to the under side of the oven Q for this purpose, the damper S^3 is opened and the fire-gases will then be drawn down through the combustion-chamber H, and will pass the damper S^3 and under the oven Q, swing round the plates T′ and T^2, and through the opening A^7 into the escape-flue G′. If it should be desired to apply both bottom and top heat to the oven, then both the dampers S^3 and B^6 are opened, so that some of the products of combustion will travel in the manner before described, while others of the said products will be drawn sidewise from the fire and pass over the top and down the side of the oven Q, at the lower outer corner of which they will meet and escape with those which had passed previously through the damper S^3 and beneath the oven Q. If, instead of applying all the heating powers to the oven Q, it is desired to apply them to the boiler R, the dampers B^6 and S^3 are closed and the damper S^2 opened, when the products of combustion will pass under the said boiler R in a manner similar to that described in reference to the bottom heating of the oven, the said products of combustion finally reaching the escape-flue through the opening A^8, there preferably being no flue-passage over the boiler.

It will be obvious how, by the manipulation of the various dampers, the escaping fire-gases may be divided so as to give off part of their heat to the oven and part to the boiler. The heated air introduced into the combustion-chamber for rendering more complete the combustion therein passes in the direction indicated by the arrows in Fig. 12, through the holes Y′ in the skirting Y, under the bottom plate T, up through the heating-chamber W, and out through the holes W′.

Both the before-described ranges are provided with a sufficiency of soot-doors D^6 for enabling all the required parts to be properly cleaned.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim as the improvement in ranges and the like is—

1. A stove or range having a fire-place provided with a back plate or lining made up of separate pieces D′ of fire-brick, having one or both horizontal edges provided with a recess, and having a flue or passage for the products of combustion between the said back of the fire-place and the hot plate *h*, substantially as set forth.

2. A stove or range having a fire-place, an oven, a chamber M^7 beneath the oven for the products of combustion, longitudinal partitions *s*, which divide the forward part of the chamber M^7 into draft-flues leading into the draft-chamber beneath the oven, and a transverse partition T′, arranged, as shown, opposite the ends of said longitudinal partitions to cause the products of combustion to pursue a tortuous passage beneath the oven, substantially as set forth.

3. The combination, with a fire-place A, of

an oven Q, boiler R, back plate D, with slots E, dampers D^4, S, and U, partition-plates T′, T′, Q′, Q^2, and Z, hot-air pipe W, and chambers H and M^7, all substantially as and for the purpose herein described.

4. A stove or range having a fire-place, boilers on opposite sides of the fire-place, an oven in rear of the fire-place, a draft-chamber below the boilers and the oven, and a scoop-shaped damper S, having downward-projecting sides which form the side walls of the draft-passage below the boilers, arranged substantially as described.

5. A stove having a back piece or lining to the fire-place and a passage for the products of combustion between the said back plate or lining and the hot plate *h*, and a pipe arranged to be heated by the products of combustion and opening into or adjacent to the said passage for delivering thereto a supply of heated air, substantially as set forth.

6. The combination, with a stove having a removable top plate Q^5 and the flue G′, having an opening through the side thereof, of a removable hood C^6 and a damper M, situated within the hood, substantially as set forth.

7. The combination, with an outlet-flue G′, an oven Q, and boiler R, of two openings A^7 and A^8, one larger than the other, substantially as and for the purpose herein described.

8. The combination, with a fire-place A, of an oven Q, boiler R, back plate D, with slots E, dampers D^4, B^6, S^2, and S^3, chambers H and M^7, partition-plates T′ T^2, and hot-air pipe W, substantially as and for the purpose herein described.

In testimony whereof I have hereto set my hand in the presence of the two subscribing witnesses.

EZRA LOFTS.

Witnesses:
ALFRED J. BOULT,
HAROLD WADE.