

(No Model.)

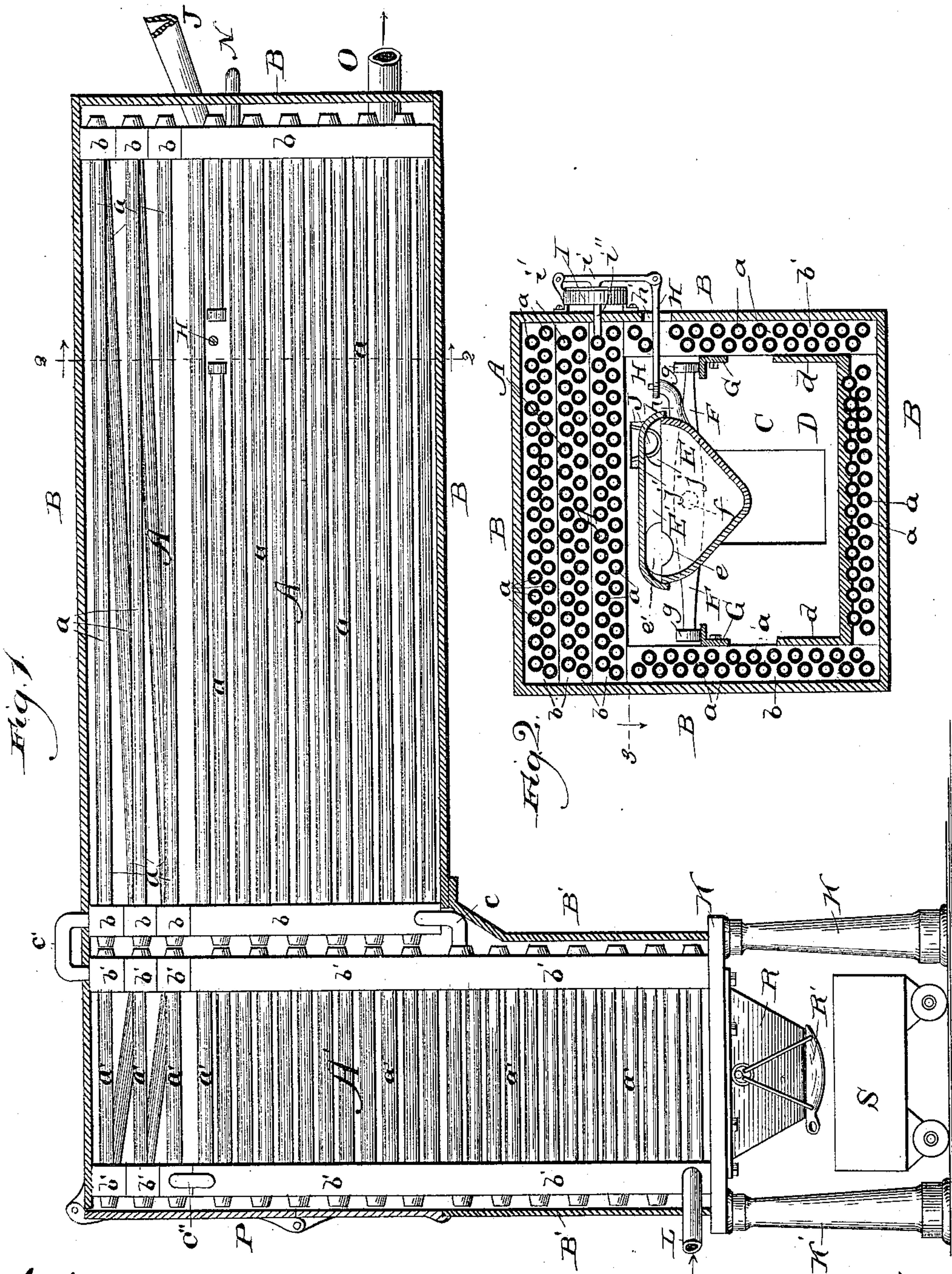
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J. E. PECK.

SLAG FURNACE.

No. 379,600.

Patented Mar. 20, 1888.



Witnesses:
Eas. & Gaylord.
Albert N. Adams.

Inventor:
Jesse E. Peck.

(No Model.)

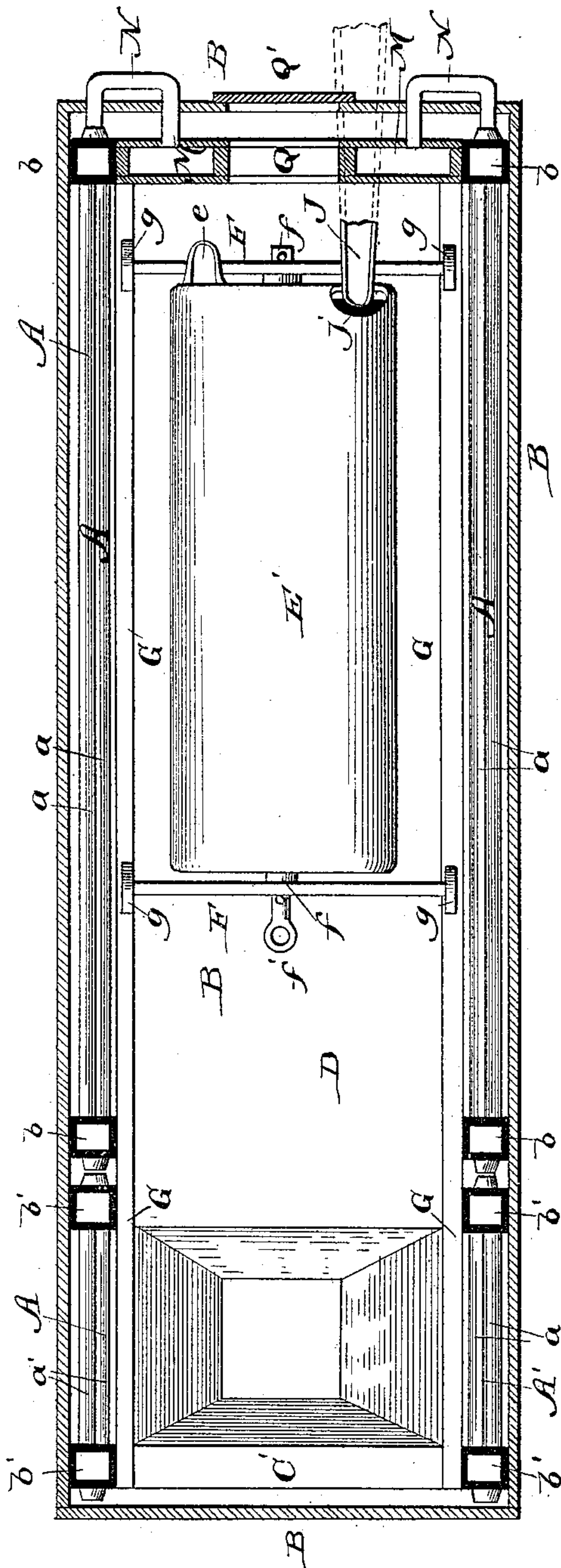
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Fig. 3



Witnesses:
Chas. E. Gaylord.
Albert H. Adams.

Inventor:
Jesse E. Peck.

UNITED STATES PATENT OFFICE.

JESSE E. PECK, OF CHICAGO, ILLINOIS.

SLAG-FURNACE.

SPECIFICATION forming part of Letters Patent No. 379,600, dated March 20, 1888.

Application filed September 10, 1887. Serial No. 249,295. (No model.)

To all whom it may concern:

Be it known that I, JESSE E. PECK, residing at Chicago, in the county of Cook and State of Illinois, and a citizen of the United States, have invented a new and useful Improvement in Slag-Furnaces for Generating Steam, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section. Fig. 2 is a cross-section on line 2 2 of Fig. 1, and Fig. 3 is a transverse longitudinal section.

The object of this invention is to construct a stove or heater for use in connection with a blast-furnace to receive the slag and other molten material that flows from the furnace and have the heat of the slag or other material radiated through the stove or heater and water passing or circulating through the stove or heater; and its nature consists in the several parts and combinations of parts hereinafter described, and pointed out in the claims as new.

In the drawings, A represents the circulating portion of the main stove, formed of a series of tubes or pipes, *a*, arranged in sections on the side, bottom, and top, and connected with suitable heads, *b*, and through which steam, water, or other fluid can flow or circulate. This section A of the stove or heater, as shown, lies horizontal, and at one end is a second section, A', which stands vertical, and is formed of a series of pipes, *a'*, connecting with heads *b'* in the same manner as the pipes *a* connect with the heads *b*, to allow a circulation through the pipes and heads.

B is a covering or casing of suitable material, which is a non-conductor of heat, and inclosing the sides, bottom, top, and end of the heater or stove, and a similar covering, B', is arranged to inclose the vertical section A' of the stove or heater.

C is a chamber formed by the pipes *a*, and C' is a chamber formed by the pipes *a'* in the respective sections A A' of the stove or heater.

D is a plate or bottom lying above the bottom pipes of the stove, and having, as shown, side walls, *d*, running up part way of the side pipes, *a*, of the stove or heater. (See Fig. 3.)

This bottom runs from end to end of the stove A and extends across the side of the stove A' adjacent to the stove A. The stove or heater A is connected with the stove or heater A' by a pipe, *c*, and a pipe, *c'*, and, as shown, the upright head *b* is connected with the cross-heads *b'* of the stove A' by a tube, *c''*, so that a free communication is had between the pipes *a a'* and heads *b b'* of the stove or heater as a whole.

E is a receiver located, when the stove or heater is in use, in the chamber C of the stove A, and adapted to receive the molten slag or material from the furnace, and having, as shown, a cover, E', and this receiver E has a spout or lip, *e*, for discharge of the molten material onto the bottom D, and, as shown, the cover E', above the spout *e*, is cut away to leave an opening, *e'*.

F are axles, one for each end of the receiver E, and on which the receiver is mounted by spindles or pins *f*, so that it can be swung or tipped sidewise.

G are tracks located one on each side of the chamber C and supported from the heads *b* or otherwise, and on which wheels *g* of the axles F run, so that the receiver can be run into or out of the chamber C.

H is a rod, the inner end of which is connected to a projection, *h*, on the side of the receiver, and this rod passes through a hole, *h'*, in the covering B, which hole is to be suitably packed, so as to be air-tight.

I is a gage having therein a pressure-diaphragm connected with a rod, *i*, pivoted to a bracket, *i'*, and connected at its other end to the outer end of the rod H, and the gage has a connection with the pipe or pipes of the stove A by a rod, *i''*, so that as the temperature in the stove becomes low and the steam-pressure in the pipes is decreased the diaphragm of the gage will fall in, drawing the arm *i* inward and causing the rod H to tilt the receptacle E, for molten slag or material to pass from the spout *e* onto the floor, thus producing additional heat, and as the heat acts and increases the steam-pressure the diaphragm will be again distended, forcing out the arm *i*, and through the link H tipping the receiver back to its normal position, by which means the

temperature of the stove is maintained at a uniform or nearly uniform degree without personal supervision.

J is a spout for supplying the molten slag or material from the furnace to the receiver E, which spout passes through a suitable packed opening, j' , in the covering B, and its end enters an opening or hole, j , in the cover E'.

K is a base-plate mounted on posts or uprights K', and to which the vertical stove A' is secured for support.

L is a supply-pipe for water, leading from a suitable supply-head to the head b' on one side of the stove A' in the arrangement shown, so that the water can pass into the head b' , and through the pipes a' and pipes $c' c''$, heads b , and pipes a .

M is a chamber at the closed end of the stove A, into which the steam is discharged from the pipes and heads $a b$.

N are tubes connecting the head b at each corner with the chamber M, as shown in Fig. 3.

O is a discharge-pipe leading from the chamber M to a blast-furnace, or such other point as it is desired to conduct the steam.

P is a door closing an opening in the vertical stove or section A' in line with the chamber C, for withdrawing the receiver E when desired to empty the receiver of the precious metal, which settles by gravitation in the bottom of the receiver E. As shown, the door is made in two sections, the lower one being hinged to the upper and the upper being hinged to the top of the stove, so that the opening can be partly or wholly closed.

Q is an opening at the chamber end of the stove A, closed by a suitable covering, Q', which is air-tight, and through which opening access can be had to the interior or chamber C, if desired.

R is a hopper closed by a swinging cover, R', and into which the cooled slag from the stove or section A' descends by gravitation to be discharged.

S is a car, into which the contents of the hopper can be dropped by withdrawing the bottom R'.

The operation is as follows: The water is admitted to the head b' at the bottom of the supply-pipe L, and this water circulates around through the pipes a' and head b' and pipes c, c' , and c'' , to enter the heads b and circulate through such heads and the pipes a , to pass finally to the chamber M through the connecting-tubes N, and the water thus circulating through the pipes and heads is heated, so as to produce steam from the water from the radiation of the heat from the slag or molten material in the chamber C and receiver E. The slag or molten material deposited in the reservoir E from the blast-furnace, and which flows from the receiver on the floor D, will be at first exceedingly hot; but the overflow lying on the floor D becomes cool, and such cool slag or material is drawn back into the chamber C' of the stove or section A' and falls by gravity to the bottom of

such chamber, so that at the point where the water is first received there will be but little heat, and this heat increases in degree until in the chamber C an intense heat is had, which heat radiates and imparts heat to the pipes by which the steam is produced from water. The steam enters the chamber M and passes therefrom to the point of discharge through the pipe O; and it will be seen that the water enters the pipe at the point where the slag or material is coolest in the stove, and from thence passes on through the pipes to the outlet, and in such passage comes into contact with the pipes lying adjacent to the hot slag or material, so that from the point of entrance to the point of escape the water is subjected to a gradually-increasing temperature, the highest temperature being at the escape as the heat from the slag or molten material is absorbed by the water circulating or passing through the pipes.

An even temperature is secured in the stove when steam is being generated by the use of the receiver E, into which the molten slag or material is received from the furnace, and this receiver is pivotally mounted so that it can be tilted end or side wise, and when so tilted an extra or larger quantity of the molten slag or material contained in the receiver will flow out and upon the floor D through the spout e , thus raising the temperature of the stove, and this outflow from the receiver may be controlled automatically by the pressure-diaphragm of the gage I, or in any other suitable manner, by having the diaphragm arranged to drop as the steam-pressure is decreased, and through the arm I and lever H tilt the receiver for the slag or molten material to flow out; and when a sufficient quantity has passed to the floor D to raise the temperature of the stove to the degree required the steam-pressure will again distend the diaphragm, forcing the arm H outward and tilting the receiver back to stop the flow.

The receiver, being located within the heating-chamber C, is subjected to the heat of the slag or molten material on the bottom D, thus maintaining the material in the receiver in a fluid condition for a longer period of time, and allowing a larger proportion of the precious metals to fall by gravitation to the bottom of the receiver; and when it is desired to remove the precious metals from the receiver it is drawn out on the tracks G and the contents removed, and to remove the receiver all that is required is to detach the rod H from the projection h and pull the receiver out by engaging a suitable tool or hook with the eye f' on one of the spindles f .

The covering B is preferably made of some non-conducting material, so as to retain the heat and have the full effect of the heat on the circulating-pipes; but it can be made of iron or other material, and the bottom D can be used without the side walls, d , if so desired, and instead of discharging the steam into the receiver M a connection might be made with

the end heads, *b*, by a pipe leading direct to the point for use.

The supply-pipe *L* can be run to one of the heads *b*, in which event the circulation and heating would be in the pipes *a* and heads *b*.

What I regard as new, and desire to secure by Letters Patent, is—

1. In a slag-furnace, the combination, with the circulating-pipes connected to the heads, as described, of a surrounding cover and receiver for molten material, substantially as described.

2. In a slag-furnace, the combination of circulating-pipes connected to heads, as described, a receiver for molten material, and a floor, substantially as described.

3. In a slag-furnace, the combination of the circulating-pipes connected to heads, as de-

scribed, the receiver *E*, rod *H*, gage *I*, connected with rod *H*, and pipe *a*, for automatically operating the receiver.

4. In a slag-furnace, the combination of the circulating-pipes connected to heads, as described, the receiver, and spout for delivering the molten material into the receiver, substantially as described.

5. In a slag-furnace, the combination of the circulating-pipes connected to heads, as described, the floor, receiver, and supply-spout, discharge-chamber *M*, and discharge-pipe *O*, substantially as described.

JESSE E. PECK.

Witnesses:

ALBERT H. ADAMS,
O. W. BOND.