

(No Model.)

2 Sheets—Sheet 1.

H. B. HALL.
PUDDLING FURNACE.

No. 472,759.

Patented Apr. 12, 1892.

Fig. 1

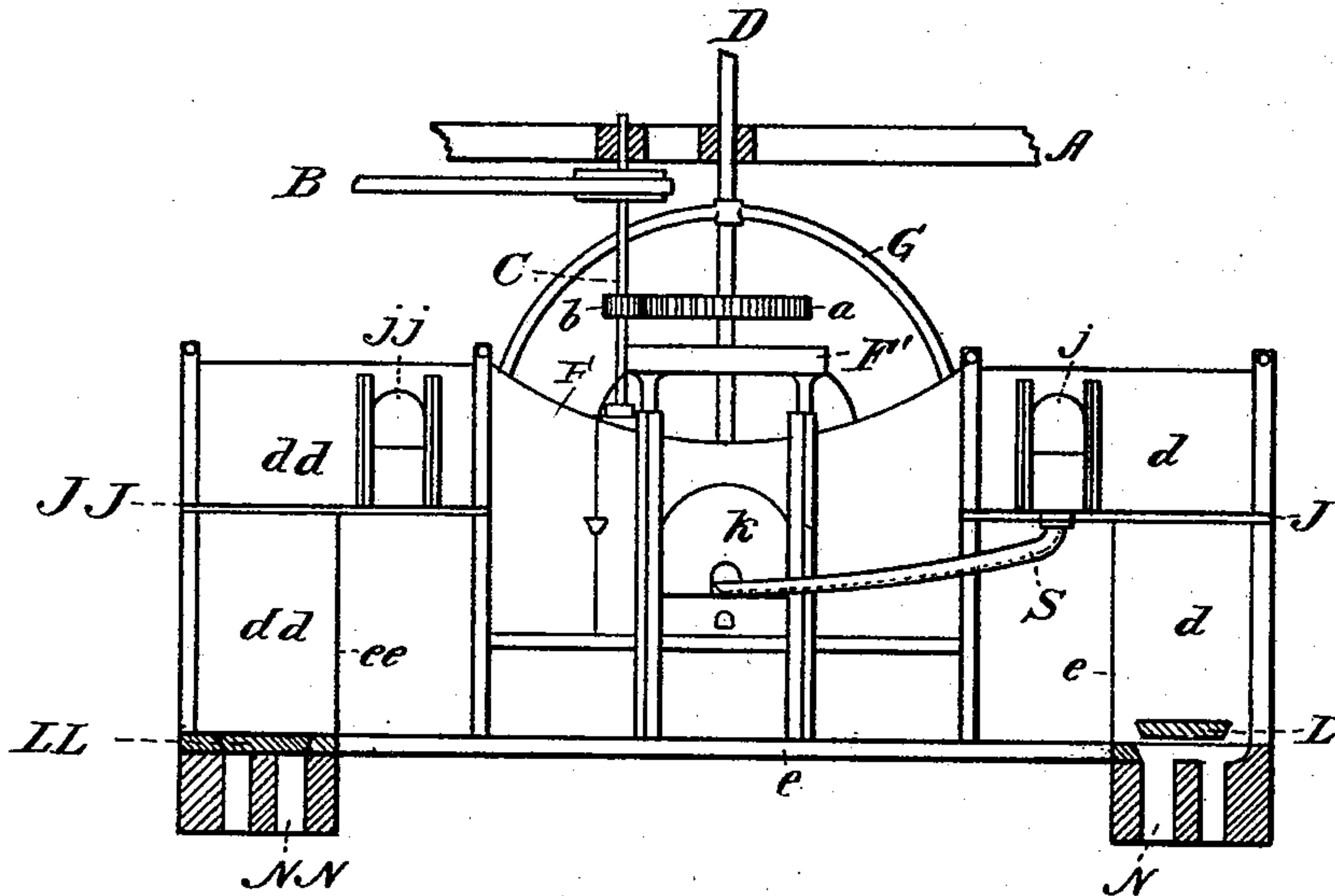
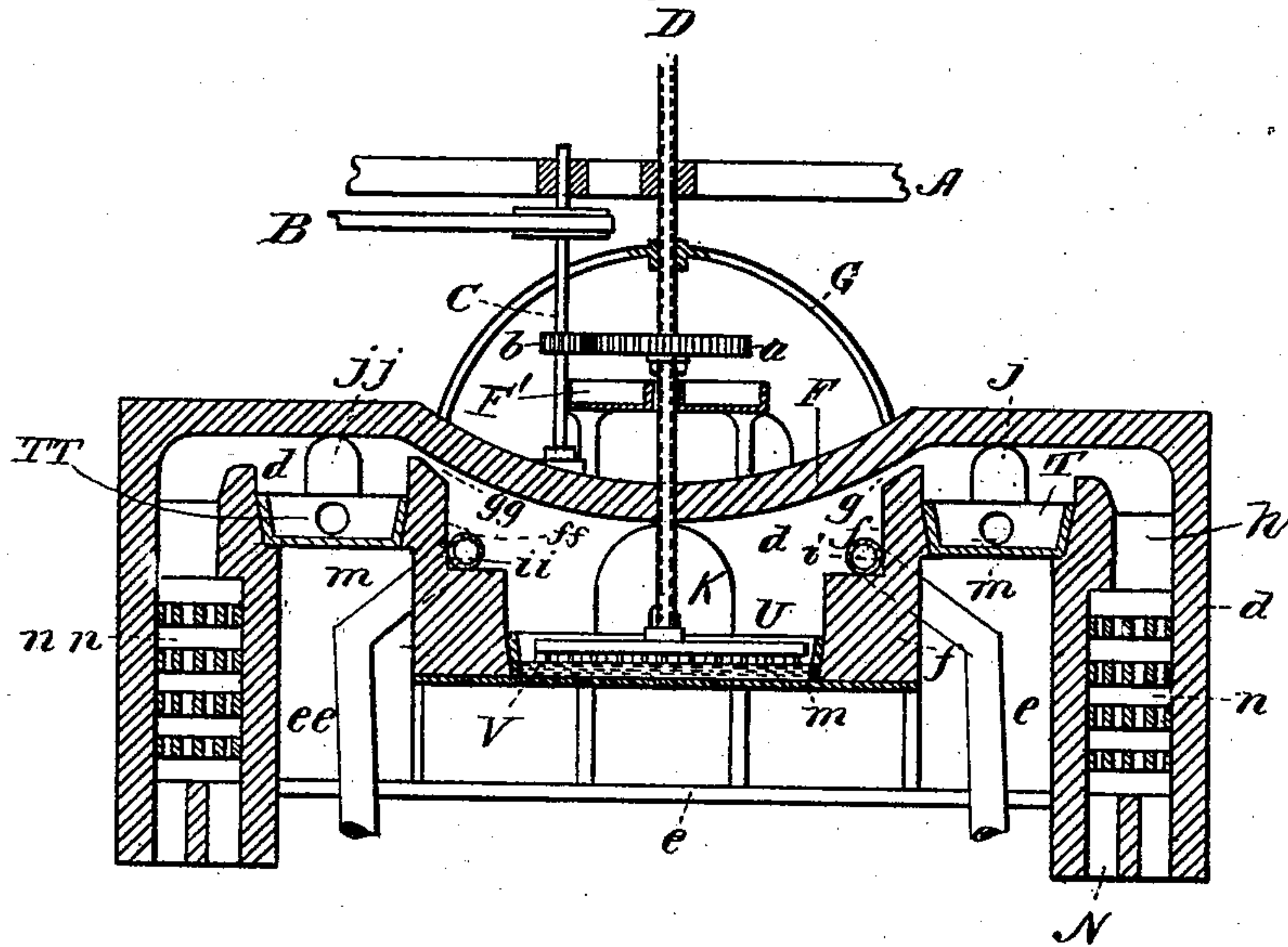


Fig. 2.



WITNESSES.

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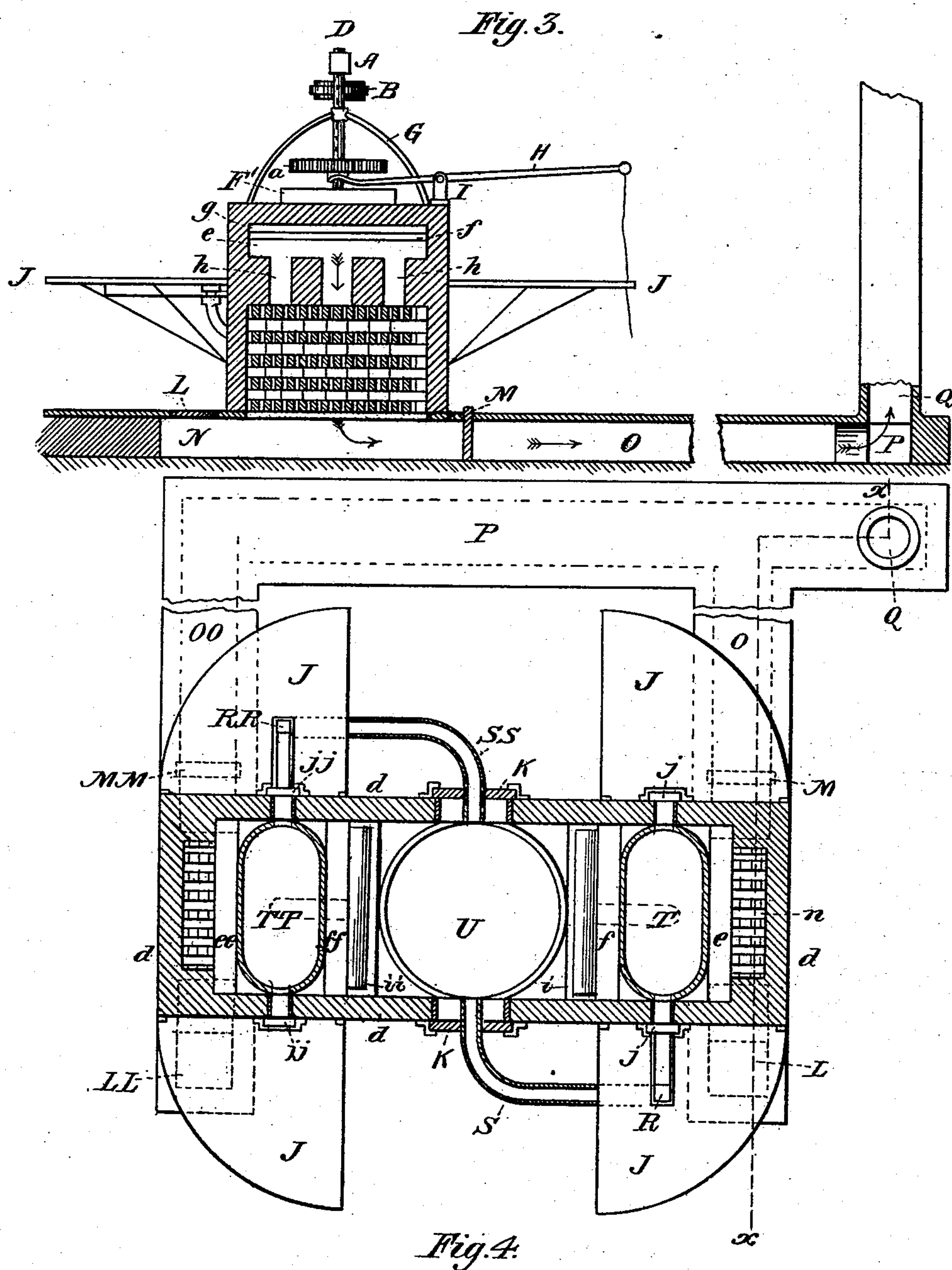
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2 Sheets—Sheet 2.

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PUDDLING FURNACE.

No. 472,759.

Patented Apr. 12, 1892.



WITNESSES.

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UNITED STATES PATENT OFFICE.

HENRY B. HALL, OF HERO, PENNSYLVANIA.

PUDDLING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 472,759, dated April 12, 1892.

Application filed July 16, 1890. Serial No. 358,914. (No model.)

To all whom it may concern:

Be it known that I, HENRY B. HALL, a citizen of the United States, residing at Hero, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Puddling-Furnace, of which the following is a specification.

My invention relates to improvements in pig-boiling or puddling furnaces, preferably, but not necessarily, heated by gas; and the objects of my improvements are as follows, viz: first, to promote the conservation of heat by providing two alternately-operating melting-chambers, in which the pig-iron is melted preparatory to being puddled in a puddling-chamber; second, to economize in time by providing two melting-chambers, one or the other of which operates simultaneously with a puddling-chamber, so as to produce a charge of melted iron in one and the other melting-chambers alternately with the same heat by which the metal in the puddling-chamber is worked, so that a practically-continuous operation of the puddling-chamber—that is, one that is necessarily interrupted only by repairs—can be effected; third, to reduce the size and cost of the furnace and to facilitate its operation by locating the checker-work above ground and between the walls of the furnace; fourth, to facilitate the control of the furnace by devising a compact arrangement of its flues and dampers.

My invention consists in the hereinafter-described mechanism for accomplishing these objects, and is succinctly specified in my claims.

In the accompanying drawings, Figure 1 is a front elevation of my furnace. Fig. 2 is a central longitudinal vertical section of the same. Fig. 3 is a vertical section on the line *xx* of Fig. 4. Fig. 4 is a horizontal section through the melting and puddling chambers of the furnace and illustrates the plan thereof.

Referring to the letters on the drawings, *d d* and *e e e* indicate the outer and inner walls, respectively, of my furnace.

On opposite ends of the furnace are provided flues *N* and *N N*, which, through the common flue *P*, by means of the flues *O* and *O O*, respectively, communicate with the stack *Q*, by which a sufficient draft through the flues is produced.

L and *L L* indicate valves, and *M* and *M M* dampers to the flues *N* and *N N*, respectively. The valves serve to exclude the outside air from the flues, and the dampers more especially to shut off the draft within the flues themselves.

Between the outer and inner walls of the ends, in what might be called the “legs” of the furnace, above the ground, is located in each end a system of checker-work *n n n*. Above and a little to one side of them, so as to leave passages *g* and *g g*, respectively, and flues *h* are carried upon the inside walls of the furnace and the walls of the puddling-chamber, melting-chambers *T* and *T T*, which are composed of outer side walls that are practically continuations of the inner walls *e* and *e e*, respectively, of the furnace and of the inner side walls *f* and *f f* and bottom plates *m m*. These melting-chambers are preferably oblong in shape.

Below the level of the melting-chambers is carried a puddling-chamber, preferably nearly cylindrical in shape and having regularly-rounded sides, whereby the operation of puddling and of keeping the chamber in repair may be more easily and expeditiously accomplished. The walls of this chamber are practically continuations of the inner side walls of the melting-chambers *f* and *f f*, respectively, and are so lettered in the drawings.

m designates the bottom plates of all the chambers.

The melting-chambers are provided with doors *j* and *j j*, respectively, and the puddling-chamber with doors *K*. Each of the melting-chambers is provided at its opposite end with a trough *R* and *R R*, which, by means of the doors *j* and *j j*, the spouts *S* and *S S*, and the doors *K*, establish communication between the melting-chambers and the puddling-chamber.

J and *J J* indicate platforms constructed to facilitate access to the melting-chamber.

i indicates the locations of gas-jets, which may be supplied by any suitable means, which are shown as consisting of pipes or tubes leading to the melting-chamber. The matter of location of the jets and the fuel employed, however, are not essential in practice.

It will be observed that the top *F* of the furnace over the puddling-chamber is depressed or dished in order to deflect the pro-

ducts of combustion directly against the metal in the chamber. D designates a shaft that is carried in suitable bearings, which are located in the top of the chamber, the spider 5 G and a beam A of the building under which the furnace is built. At the lower end of this shaft is a tool V. This shaft is operated by cog-wheels *a* and *b*, a shaft *c*, and belt B. These elements form no part of my herein- 10 described invention, and are only illustrated incidently.

In operation, supposing that one of the melting-chambers—for instance, T T—is charged with pig-iron and all the apertures of the fur- 15 nace to be closed, the jets having been ignited at the points indicated by *i* in the drawings, air is admitted by means of the valve L through the flue N, up through the checker-work *n*, flue *h*, and the space *g* into the cham- 20 ber U, where, intermingling with the flame at *i*, it produces great heat for puddling the metal therein. Thence passing out through the space *g g* over the melting-chamber T T, the products of combustion melt the pig in that chamber and pass out through the flues 25 N N, O O, P, and the stack Q. By the time the operation of puddling is completed in the chamber U and the metal ready to be drawn, the pig in the chamber T T is ready to be in- 30 troduced into the chamber U, so that by a reversal of the operation just described—that is, charging the chamber T, closing the valve L and the damper M and M, and opening the valve L L and the damper M, extinguishing 35 the jets *i*, and igniting the jets at *i i*—the operation can be repeated, as before, the chamber U having been previously supplied with the charge of melted pig from the chamber T T, which is drawn directly from the melting- 40 chamber through the trough R R and the spout S S into the puddling-chamber. It will be perceived from this description that the operation is practically continuous and can be carried on so long as the condition of the 45 chambers will permit. No cessation is re-

quired, except for the purpose of repairing and keeping the chambers in proper condition. It was stated before that in the beginning the puddling-chamber was provided with a proper charge. This may be, in the first in- 50 stance, produced by a proceeding, as in the operation first above described; but, if desired, with the exception that the jets at *i i* instead of those at *i* are ignited, and consequently heat sufficient to melt the pig in the 55 chamber T T is produced without having to pass through and unnecessarily heat the empty puddling-chamber.

What I claim is—

1. In a furnace, the combination of a 60 puddling-chamber having doors on opposite sides, melting-chambers on opposite sides of said puddling-chamber, said melting-chambers having communication with the stack of the furnace through flues, as described, and 65 having communication with the puddling-chamber through openings *g* and *g g* for the passage of air, troughs R and R R, and spouts S and S S, connecting said melting-chambers with said puddling-chamber and serving to 70 conduct the metal from the one to the other, and means for heating said melting-chambers and puddling-chamber.

2. The combination of melting-chambers 75 having doors, a puddling-chamber between said melting-chambers, doors leading thereto, troughs and spouts connecting said puddling-chamber with both of said melting-chambers, ducts from each of the melting-chambers to the puddling-chamber, a source of heat con- 80 sisting of a fuel-pipe leading to the puddling-chamber, flues leading to said melting-chambers, means for opening and closing said flues, and a stack communicating with said flues, substantially as specified.

HENRY B. HALL.

Witnesses:

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JAMES M. NEVIN.