3 Sheets—Sheet 1.

W. E. HENDERSON.

HOT-AIR FURNACE.

No. 188,902. Patented March 27, 1877.

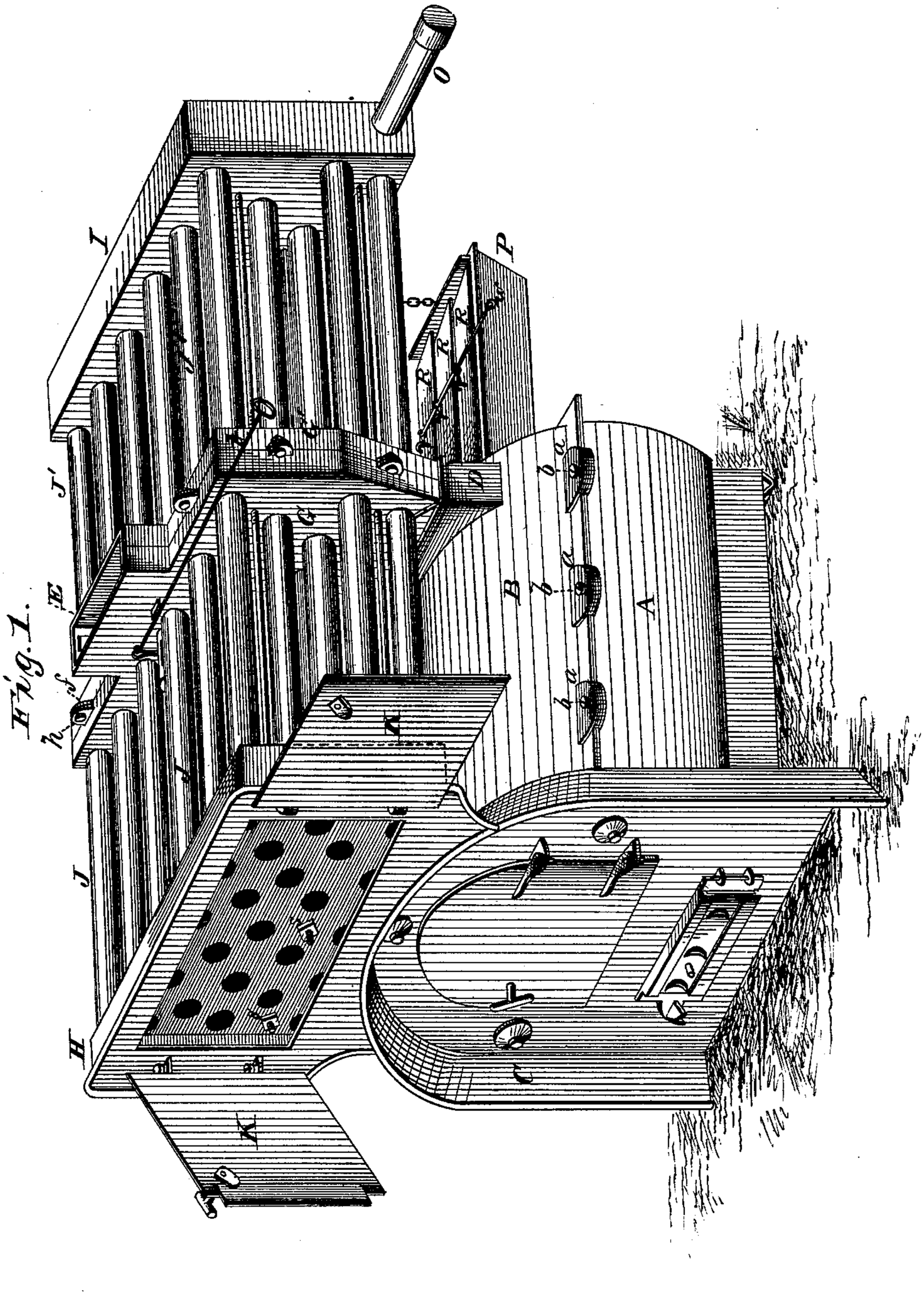

Fig. 1.

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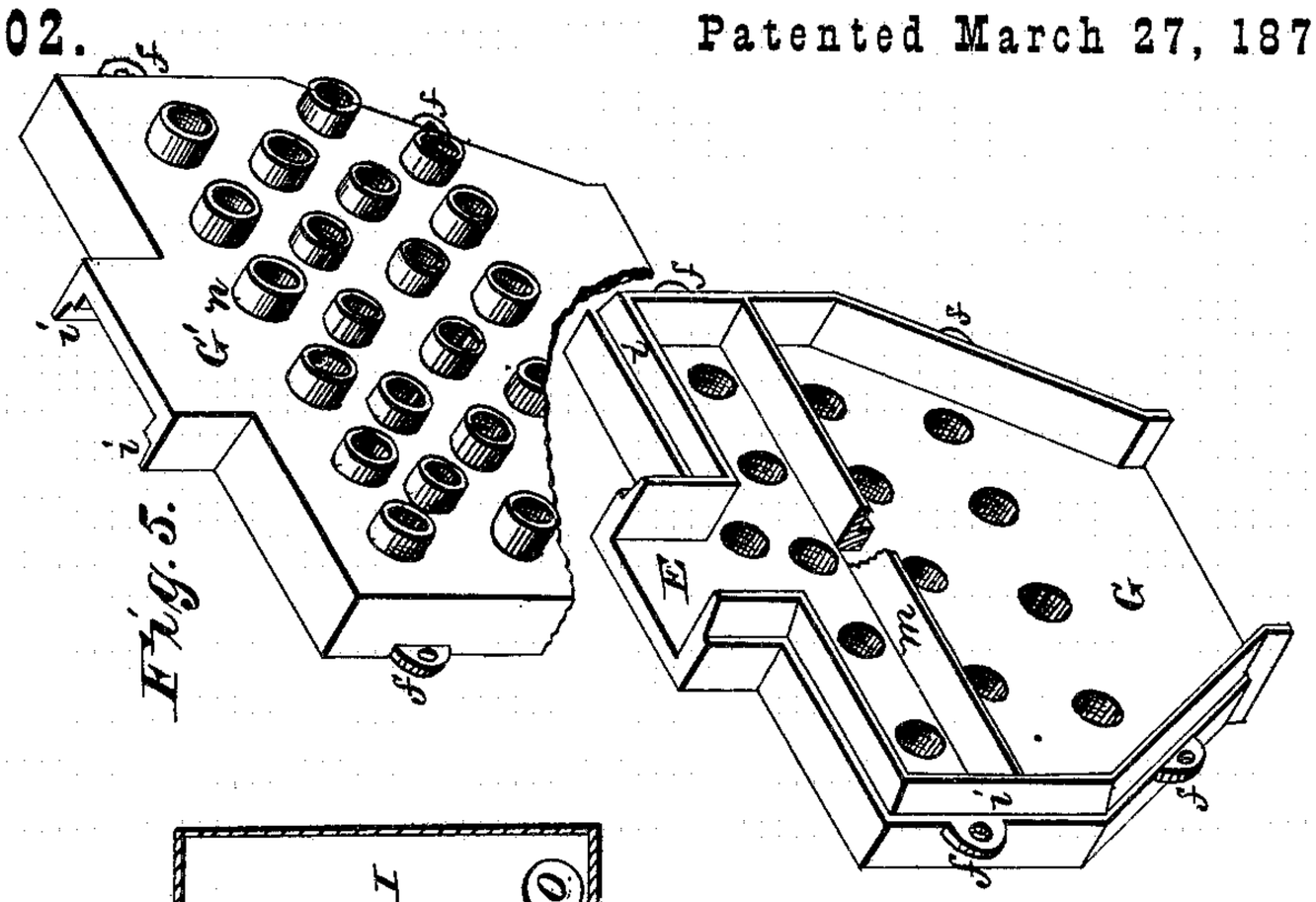

Fig. 5.

Fig. 6.

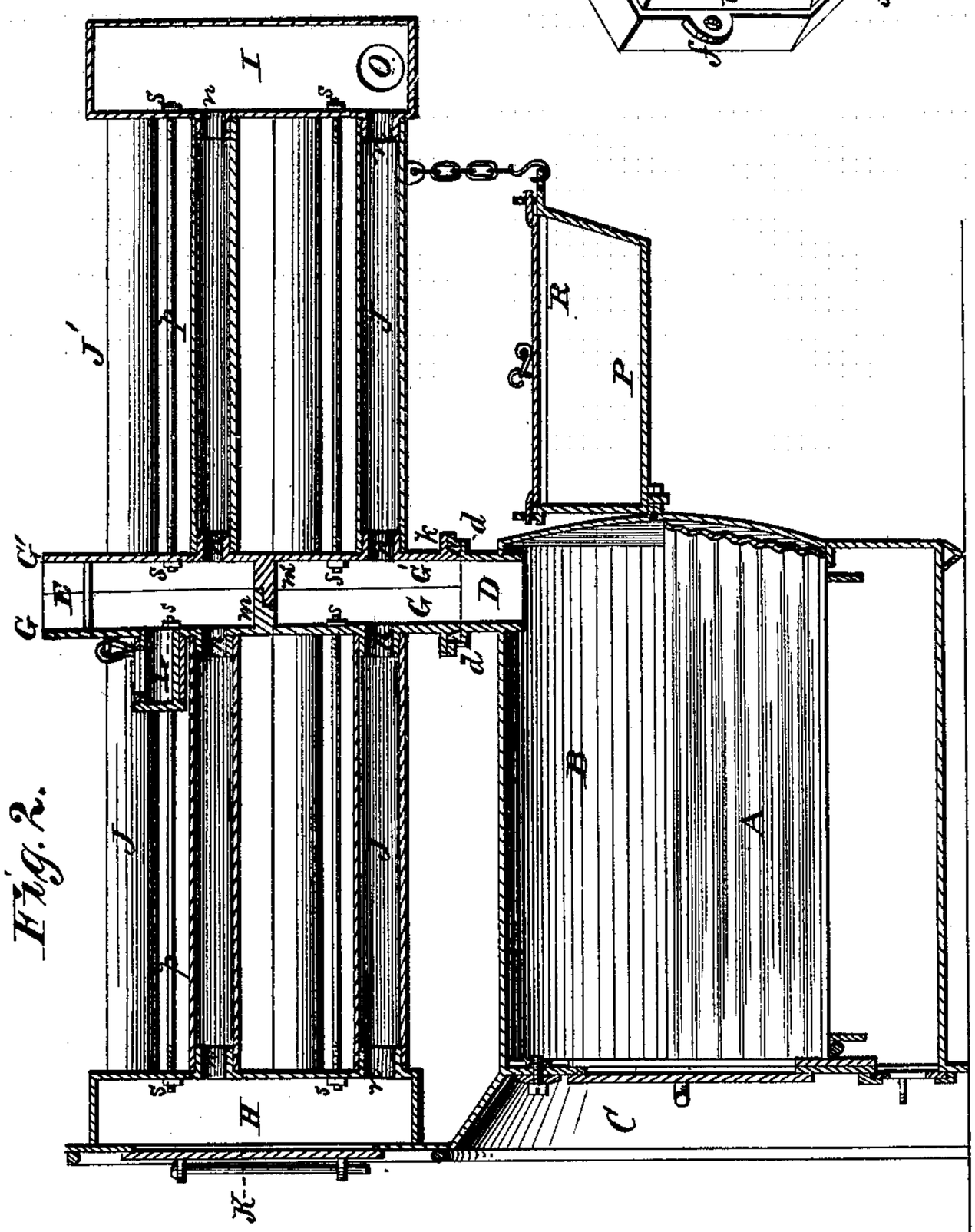

Fig. 2.

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Fig. 3.

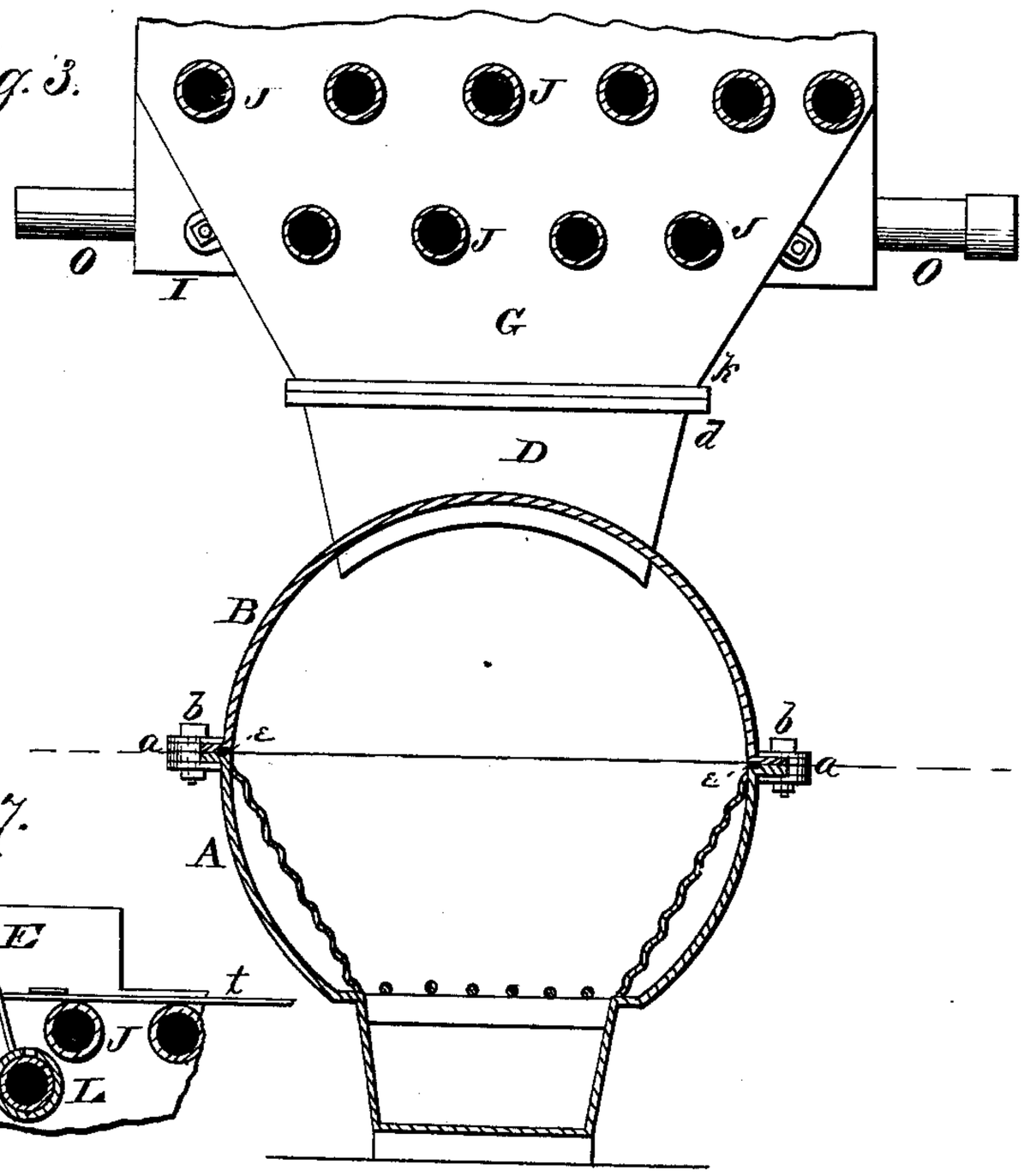
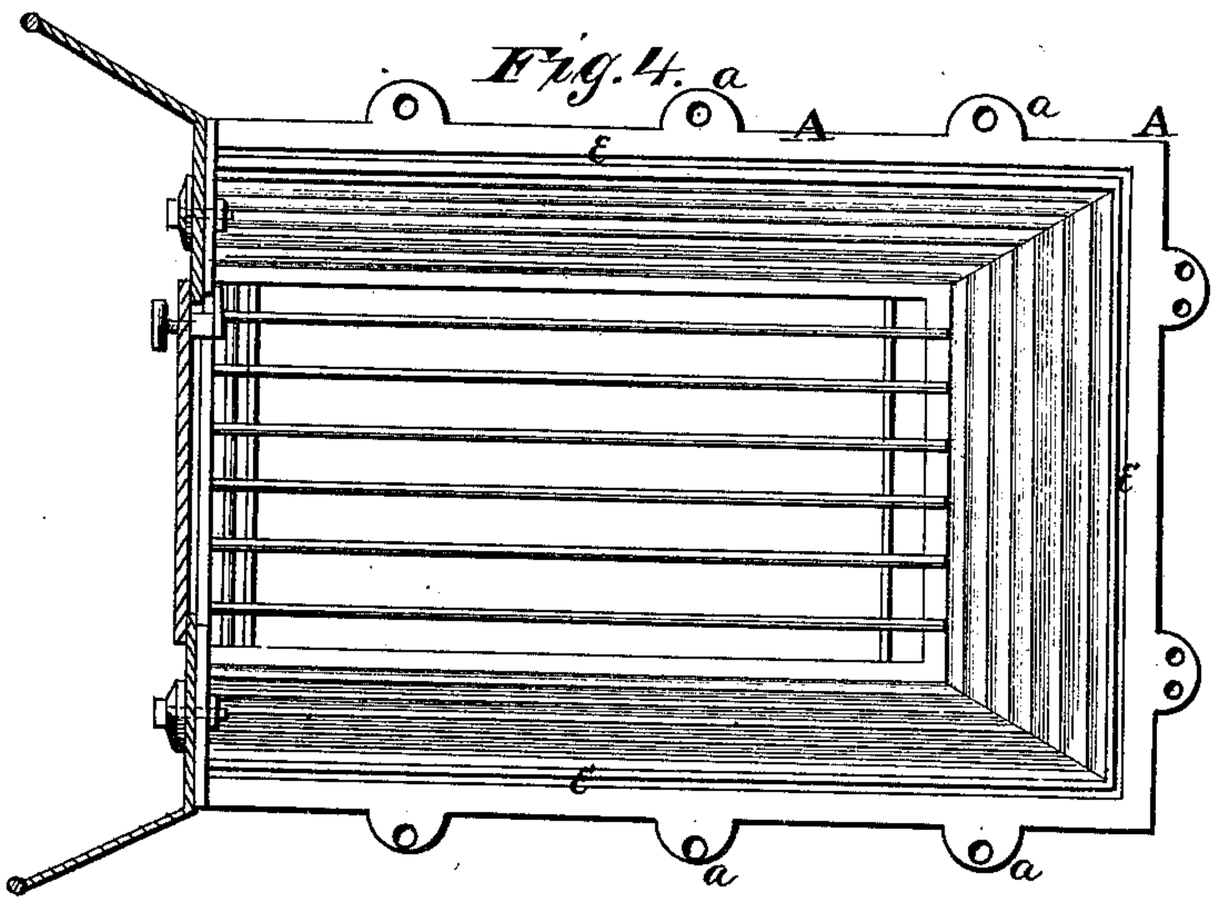


Fig. 7.

Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM E. HENDERSON, OF WINONA, MINNESOTA.

IMPROVEMENT IN HOT-AIR FURNACES.

Specification forming part of Letters Patent No. **188,902**, dated March 27, 1877; application filed February 8, 1877.

To all whom it may concern:

Be it known that I, WILLIAM E. HENDERSON, of Winona, in the county of Winona, and in the State of Minnesota, have invented certain new and useful Improvements in Heating-Furnaces; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

The nature of my invention consists in the construction and arrangement of a heater, as will be hereinafter more fully set forth.

In order to enable others skilled in the art to which my invention appertains to make and use the same, I will now proceed to describe its construction and operation, referring to the annexed drawings, in which—

Figure 1 is a perspective view of my improved heater. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a cross-section through the furnace and pipes above it. Fig. 4 is a plan view of the bottom part of the stove or furnace. Fig. 5 is a detached view of the center head. Fig. 6 is a cross section of the evaporator. Fig. 7 is a detailed view of the check-draft at the top of the heater.

The body of the stove or furnace, in which the fire is made, is cast in two pieces, A and B, provided at their adjoining edges with projecting lugs *a*, through which are passed bolts *b*, to fasten the two parts together.

Along the upper edge of the lower part A is made a narrow groove, *e*, as shown in Fig. 4. This groove is filled with cement, and the edges of the upper piece B are to fit into the same, so as to make a perfectly air-tight joint.

The front C of the stove is constructed in any suitable manner, and fastened thereto by bolts, or otherwise, after the parts A and B have been properly united.

On the rear end of the top part B is cast a flue-collar, D, projecting upward a suitable distance, and provided at its upper end with an interior shoulder or offset, *d*, upon which the lower end of the center head of the heater rests.

This center head is cast in two pieces, G and G′, and provided on their adjoining edges with projecting lugs *f*, through which bolts *h* are passed to fasten them together. The adjoining edges of the two parts G G′ are formed with shoulders *i*, to overlap each other and form tight joints; and around the lower end, which is inserted in the collar D, is a bead or flange, *k*, to rest upon the upper edge of said collar. At the top of this center head is formed the smoke-exit E.

Within the center head G G′ is a horizontal diaphragm, *m m′*, cast with the two pieces, one-half with each, and the one overlapping the other more or less, so as to secure a tight joint.

The center head thus constructed is connected by two series of flues or tubes, J and J′, respectively, with the front head H and rear head I, the tubes of the two series corresponding exactly with each other, as shown.

In connecting the flues or tubes of this class of heaters with the heads there has been found considerable difficulty, in that the heads were liable to be crushed in by the expansion of the tubes if the front and rear heads were connected by rods, as the tubes were always the first to expand. To obviate this difficulty the three heads are cast with projecting collars *n* around the openings, and the ends of the tubes are passed over said collars. The two parts G G′ of the center head are connected, respectively, with the front and rear heads by rods *p*, having nuts *s* on their ends. The flues or tubes are put on their collars, and the nuts *s* on each half of the heater are screwed up tightly, so as to bring the parts properly together; then, by loosening said nuts slightly, there will be room for play in the expansion and contraction of the tubes without danger from the escape of smoke through the joints, and obviating the liability of having the heads crushed in.

The smoke and heat passes from the stove up into the center head G G′, filling the same below the diaphragm *m m′*, and then divides, passing to the front and rear heads through the flues or tubes situated below said diaphragm, and returns through the flues above the diaphragm to the center head, and out through the exit E.

At the top of the heater is a check-draft or damper, L, operated by a rod, *t*, or otherwise, for admitting air into the center head. The

admission of cold air into the center head has been found to result in the condensation of the products of combustion, the deposition of creosote, and the consequent injury to the heater. My check-draft L, being at the top of the heater, takes in nothing but heated air, and, therefore, obviates the above difficulty.

The rear head I is provided near the bottom with two "clean-outs," O O, one on each side, which is of importance, as the furnace or heater cannot always be placed so that one particular side can be used. By having one on each side, one may be closed and the other opened for the removal of soot and ashes.

The flues or tubes J J′ can be cleaned by opening the doors K of the front head H, and passing a swab through to the rear head.

P represents the evaporator, having one end attached to the rear end of the stove, and the other end suspended by chains, or otherwise, as desired.

Over the top of the evaporator are pivoted a series of fans or covers, R R, connected by a rod, *w*, running out through the side of the casing, by means of which said fans or covers may be opened more or less, so as to cause a greater or less evaporation, as may be desired.

In this construction of heater, in case a pipe becomes defective through clogging, or from being burned out, the opposite pipe takes up the burden. and the operation of the heater is not impeded.

Several of the flues may be removed from the full-sized heater, while in operation, without the heater sustaining any damage, and both doors K of the front head may be opened, when the furnace is in use, without the escape of any appreciable amount of smoke.

I do not broadly claim, under this specification, a system of heating-flues composed of three vertical and parallel hollow sections, the central one of which is provided with a horizontal diaphragm, and two groups of tubes connecting the heads, and arranged in alignment, as such is the subject of a previous application made by me, and now before the United States Patent Office.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The center head G G′, cast in two parts, with the horizontal diaphragm *m m′*, cast one-half with each part of the center head, in combination with the series of horizontal pipes J J′ and the front and rear heads H and I, all substantially as herein set forth.

2. The center head herein described, cast in two parts, G G′, with shoulders *i* around their edges, and the interior horizontal diaphragm cast in two parts, *m m′*, one-half with each part of the head, so that the parts will overlap each other, and be fastened together by bolts *h*, passing through projecting lugs *f*, all substantially as and for the purposes herein set forth.

3. The combination of the end heads H and I, having collars *n n* cast therewith, the central head G G′, having collars *n n* cast on each section thereof, and having interior partition *m m′* and shoulders *i* all cast therewith, the horizontal flue-tubes J J′, and the double set of connecting-rods *p p*, all substantially as herein set forth.

4. The check-draft L, arranged as described, and provided with the operating-rod *t*, in combination with the central head, having a central diaphragm, the end heads H I, tubes J J′, and exit-flue E, all substantially as set forth.

5. The detachable evaporator P, provided with the pivoted fans R, connected and operated by the rod *w*, suspended under the pipes J′, and attached to the end of the furnace, as and for the purposes herein set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of February, 1877.

WILLIAM E. HENDERSON.

Witnesses:
OLIVER N. ROBERTS,
W. JAY LANDON.