

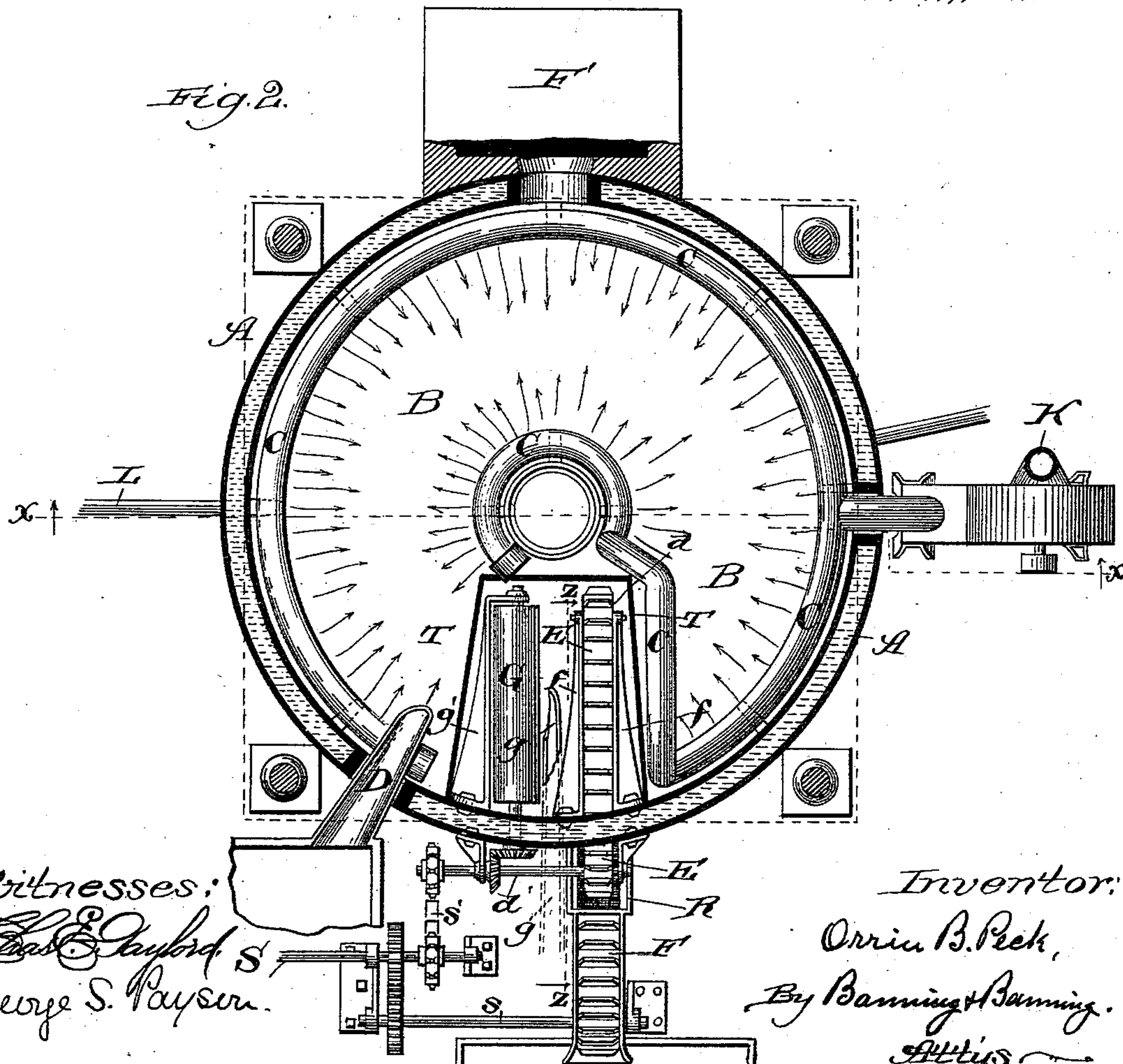
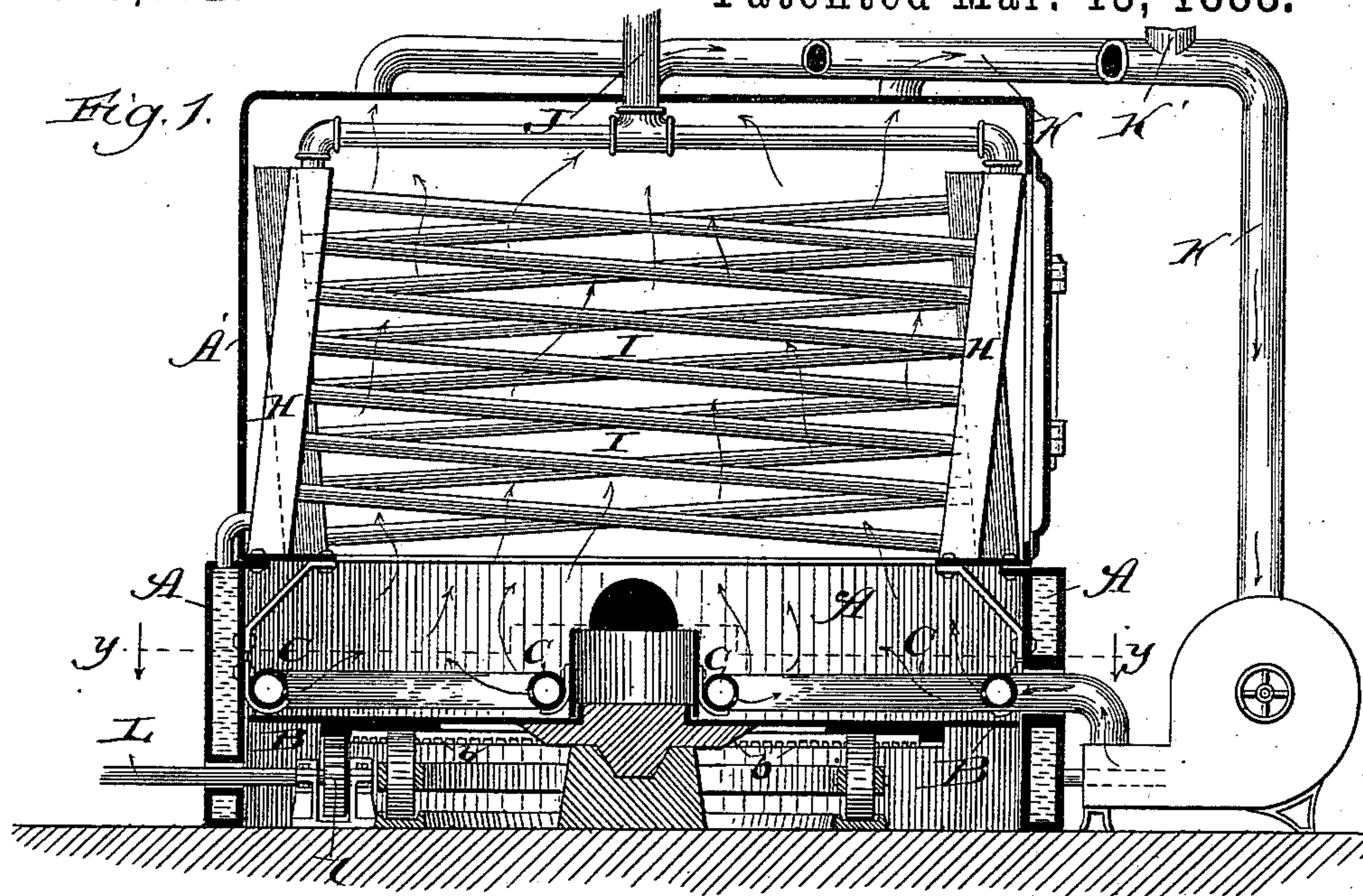
(No Model.)

3 Sheets—Sheet 1.

O. B. PECK.
SLAG FURNACE.

No. 379,412.

Patented Mar. 13, 1888.



Witnesses:

Charles E. Gaylord S.
George S. Payson.

Inventor:

Orrin B. Peck,
By Banning & Banning.
Attys

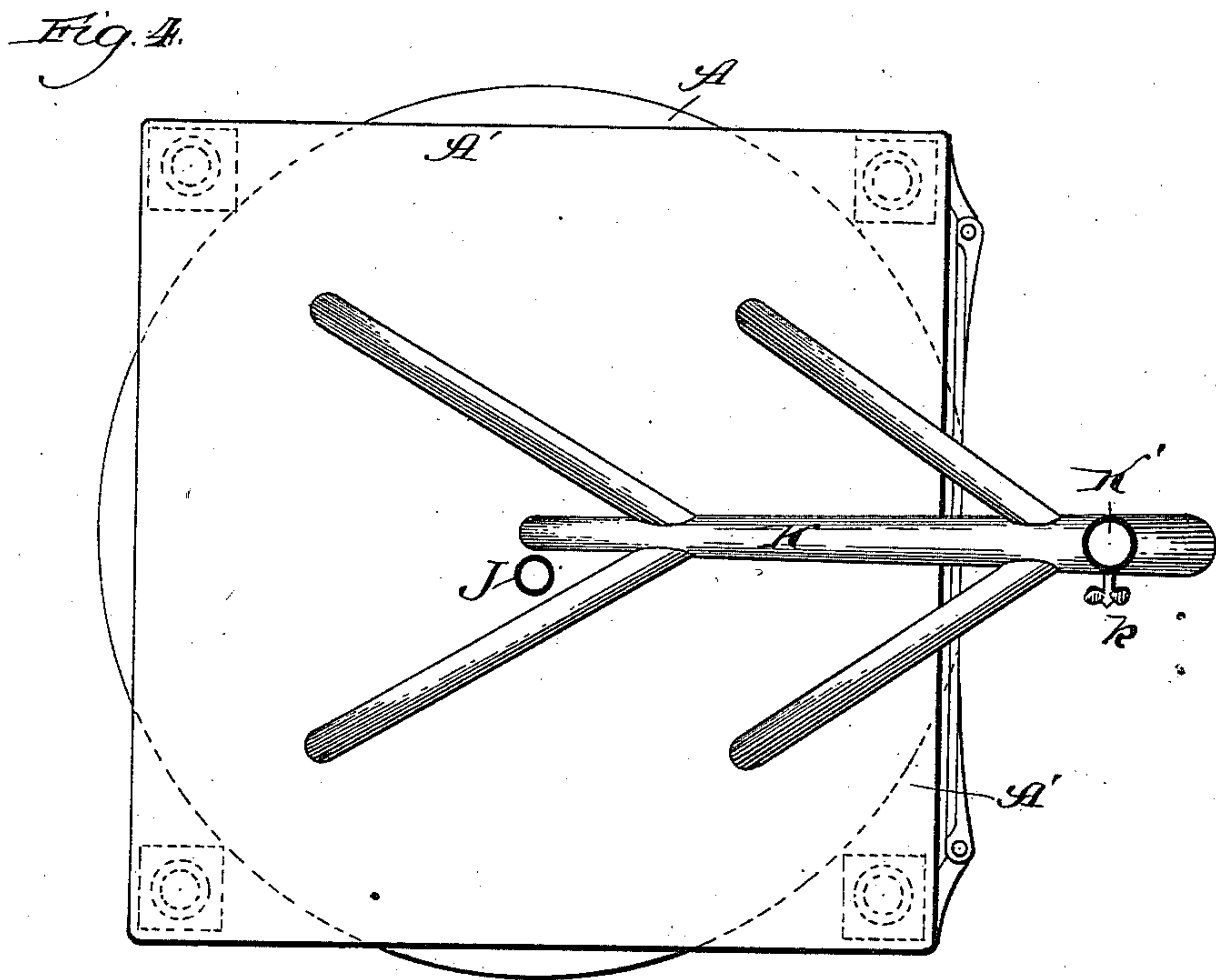
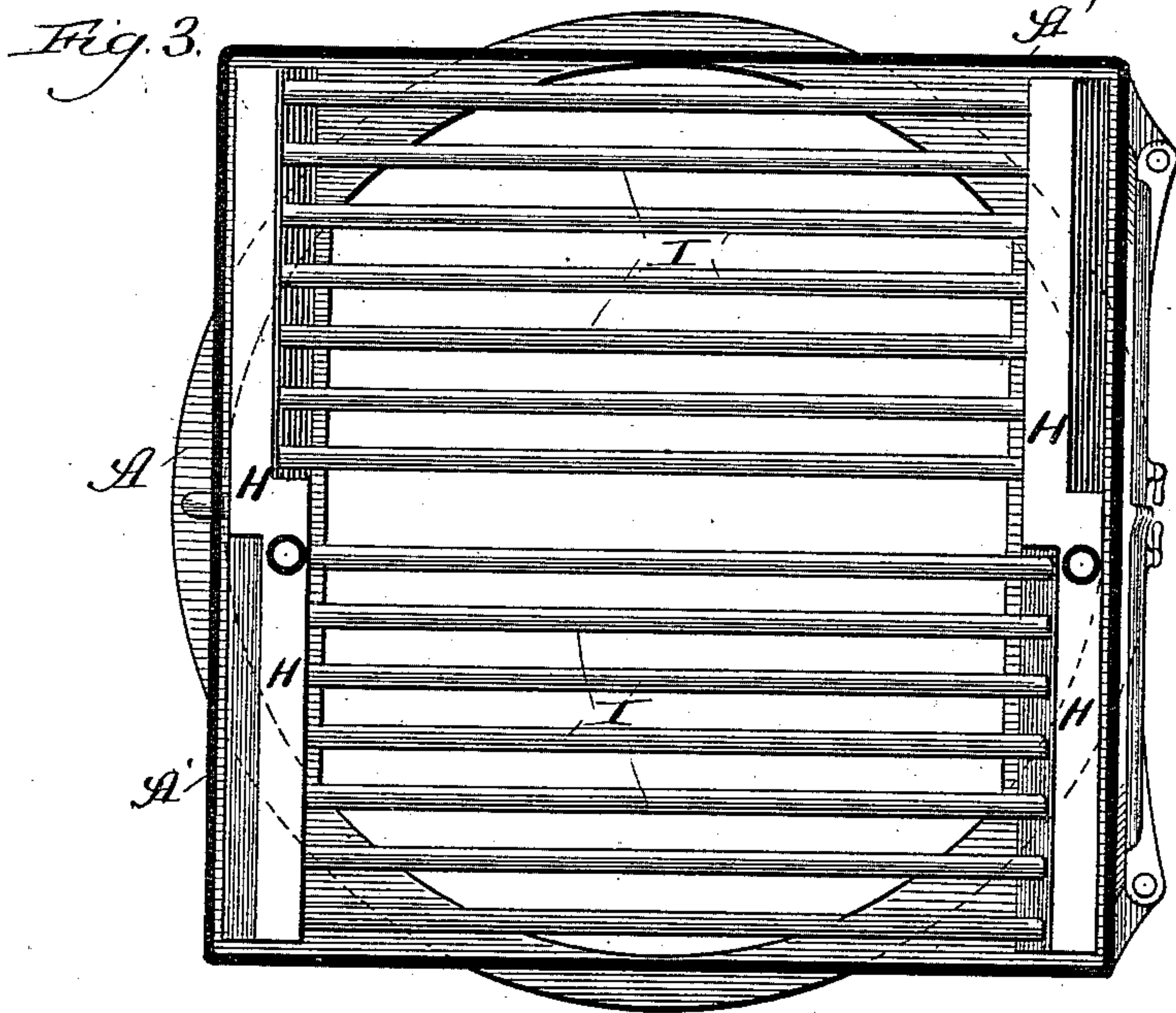
(No Model.)

3 Sheets—Sheet 2.

O. B. PECK.
SLAG FURNACE.

No. 379,412.

Patented Mar. 13, 1888.



Witnesses:
Chas. E. Gaylord.
George S. Payson.

Inventor:
Orrin B. Peck
By *Banning & Banning.*
Attys

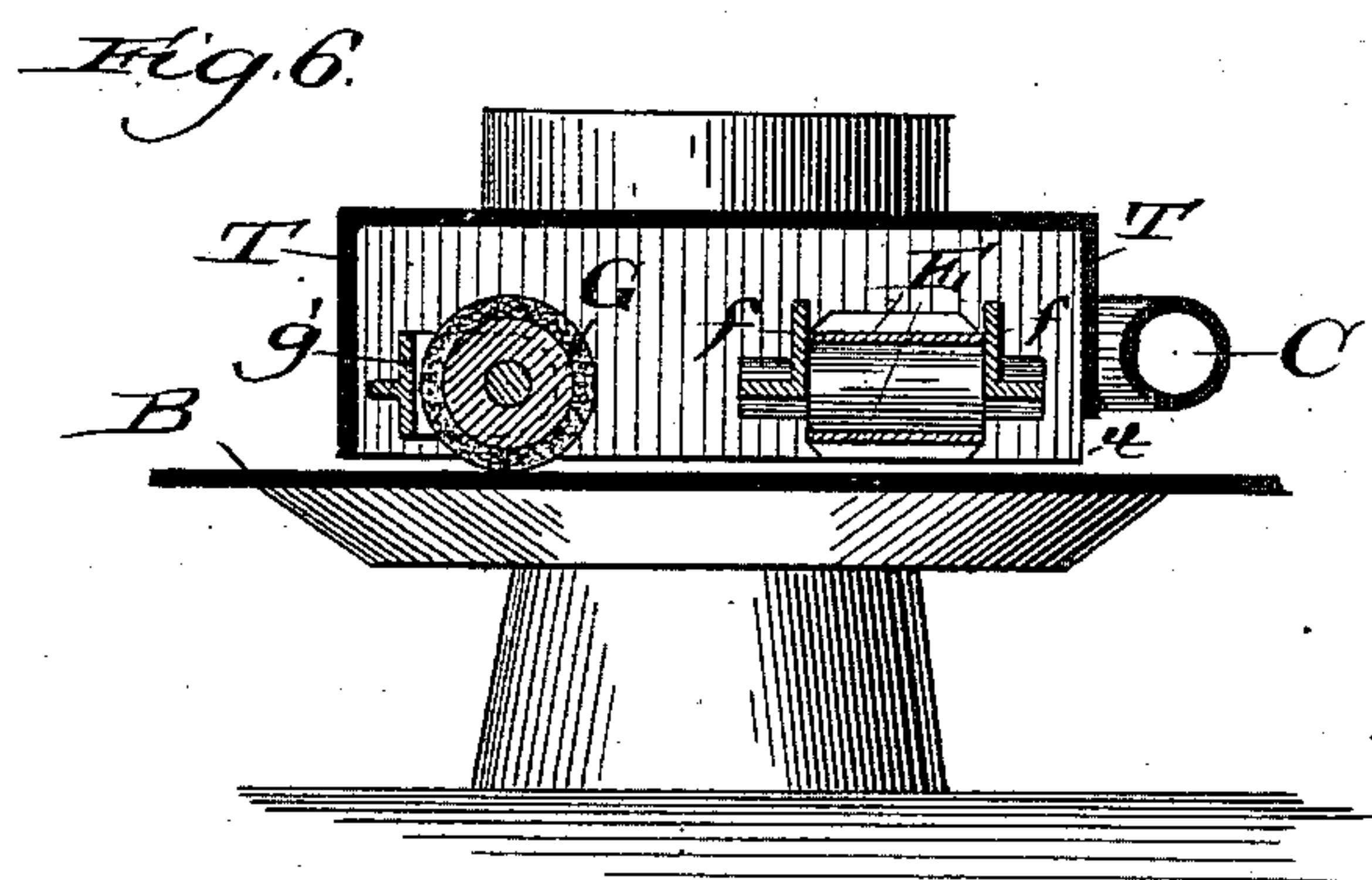
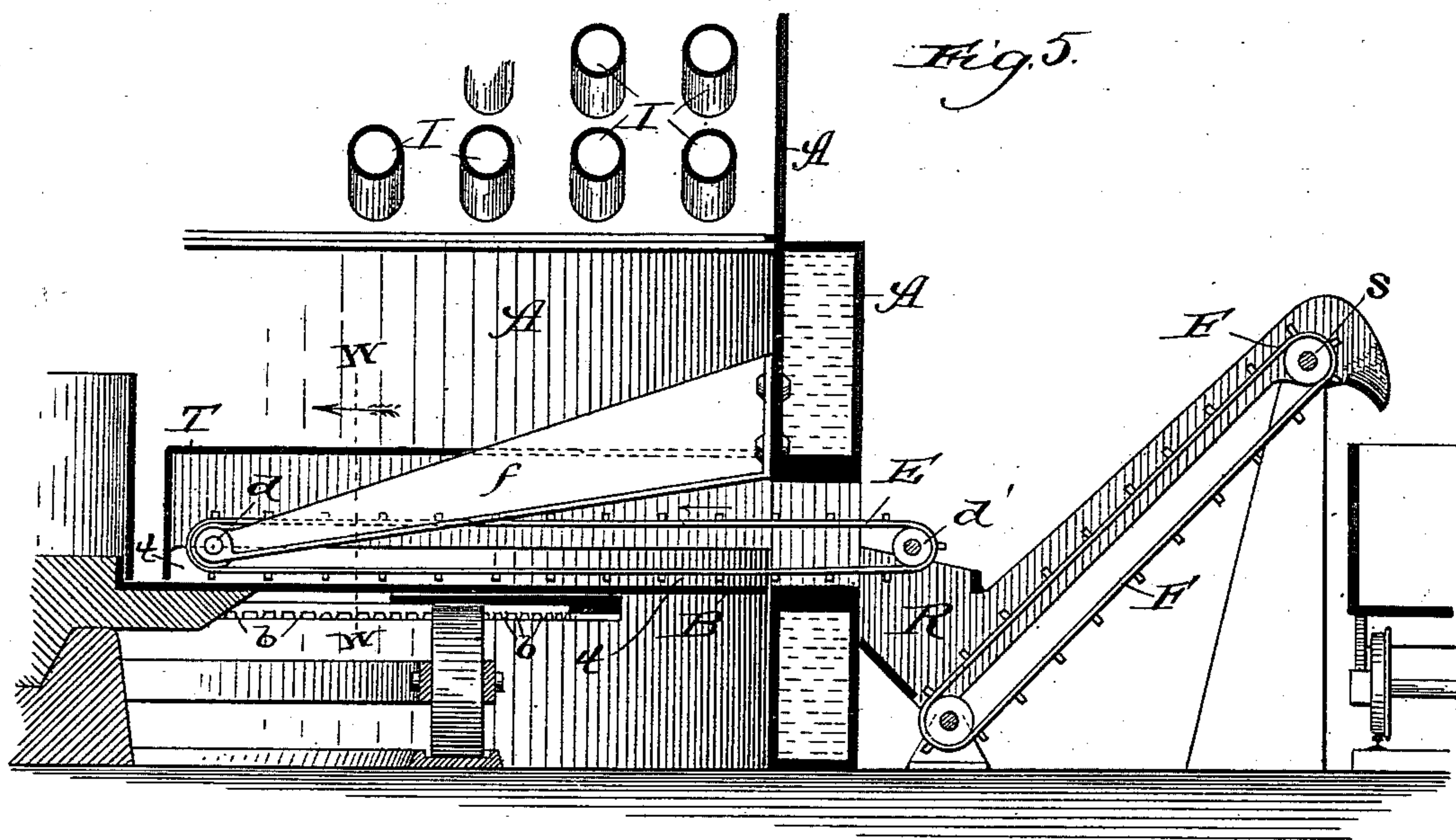
(No Model.)

3 Sheets—Sheet 3.

O. B. PECK.
SLAG FURNACE.

No. 379,412.

Patented Mar. 13, 1888.



Witnesses:
 Geo. E. Gaylord.
 George S. Payson.

Inventor:
Orvin B. Peck.
By Banning Banning
Attys

UNITED STATES PATENT OFFICE.

ORRIN B. PECK, OF CHICAGO, ILLINOIS.

SLAG-FURNACE.

SPECIFICATION forming part of Letters Patent No. 379,412, dated March 13, 1888.

Application filed November 25, 1887. Serial No. 256,159. (No model.)

To all whom it may concern:

Be it known that I, ORRIN B. PECK, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful
5 Improvements in Slag-Furnaces, of which the following is a specification.

The object of my invention is to make a furnace in which the molten or heated slag or other heated refuse from smelting-furnaces can
10 be utilized in generating steam; and my invention consists in the features and details of construction hereinafter described and claimed.

Figure 1 is a sectional elevation of my furnace and steam-boiler, taken through the line
15 *x x* of Fig. 2, looking in the direction of the arrows. Fig. 2 is a plan view of the slag-furnace, taken in the line *y y* of Fig. 1, looking in the direction of the arrows. Fig. 3 is a plan view of the boiler shown in Fig. 1 with the
20 cover removed. Fig. 4 is a plan view with the cover in place. Fig. 5 is a side elevation of a portion of the furnace and removing and elevating carriers, taken in the line *z z* of Fig. 2, looking in the direction of the arrows; and
25 Fig. 6 is an enlarged view of a portion of Fig. 5, taken in the line *w w*, looking in the direction of the arrow.

In the drawings, A represents the walls of my slag-furnace; B, the floor or table on which
30 the slag is deposited in the furnace; C, a blast-pipe leading from a force blower or fan around and above the floor or table; D, a spout for depositing the molten slag upon the floor or table; E, a carrier for removing the slag when
35 cooled; F, a carrier for elevating the discharged slag and depositing it in a car or other conveyance to remove it away; G, a roller or mop for coating the surface of the floor or table with mud or other protecting substance;
40 *g*, a spout for supplying the mud; H, the heads of the tubular boiler, arranged above the slag floor or table; I, the water-tubes to contain the water to be converted into steam; J, a pipe for conveying the steam to the steam-cylinder
45 or other place of use; K, a pipe for carrying the air and heat from the boiler around into the slag-furnace through the pipe C; L, a shaft for rotating the floor or table, and S a shaft
50 for rotating the mud-drum and the removing and elevating carriers.

As above said, the object of my invention

is the utilization of molten or hot slag from smelting and other furnaces for the production of steam. As is well known, this slag when
55 discharged in a hot or molten condition from smelting-furnaces contains a great quantity of heat, which has heretofore been wasted for the lack of proper means to apply it to the production of steam or other useful purposes.

In constructing my "slag-furnace," as I term it, for utilizing the heat of hot or molten slag in the production of steam, I make a slag holding or carrying table or floor, B, of cast-iron or other suitable material and preferably
60 of circular form, as shown in Fig. 2 of the drawings. This table or floor is provided on its under side with a rack of series of teeth, *b*, as shown in Figs. 1 and 5. These teeth are arranged in a circle around the under side of
65 the floor or table. A shaft, L, rotated by any convenient motive power, carries a gear-wheel, *l*, whose teeth mesh into the teeth *b* on the under side of the floor or table and cause it to rotate.

Of course it will be understood that the
75 floor or table is properly supported on a center post and rollers moving upon a proper track to preserve the proper position of the table and enable it to be rotated round and
80 round. These rollers, center posts, tracks, &c., are clearly shown in Fig. 1, and as by themselves they do not differ materially from the means employed for supporting and rotating a table they do not need to be more minutely described.

The floor or table B is located within the circular walls of the furnace A, which surround and inclose it. These walls are preferably provided with a space between them
90 to be filled with water to prevent their being overheated and injured by the heat of the molten slag. They need extend above the floor or top of the table no farther than necessary to enable the slag to be discharged on
95 the floor and removed again with facility. Probably twelve or fifteen inches will be found, in ordinary cases, sufficient for this purpose.

Leading through the walls of the slag-furnace I arrange a spout or pipe, D, (shown in Fig. 2,) through which the slag from the smelting-furnace may be carried and discharged on the floor. This spout may be ar-

ranged either to carry the slag directly from the smelting-furnace or from a receiver or other receptacle into which it may be discharged from the smelting-furnace, as may best suit the convenience of the operator in connection with the location and arrangement of his smelting-furnaces. A blast-pipe, C, enters the walls of the slag-furnace preferably above the floor or table and around its circumference, as shown in Fig. 2, though a straight pipe entering the furnace to discharge a current of air upon the slag while on the table may be used, if preferred. This blast-pipe may be turned so as to approach and surround the center piece of the table, as shown in that figure, if desired; but in this case that portion of the blast-pipe which crosses the floor or table to surround the center post should be raised enough above the floor to permit the slag to pass beneath it as the floor is rotated. This blast-pipe, it will be understood, is connected with a fan or blower, (shown in Figs. 1 and 2,) by which a blast or current of air may be forced into it, and it is provided with numerous perforations to permit the air when thus driven into it to pass out or onto the floor or table, as indicated by the arrows in Fig. 2. This blast or current of air coming in contact with the hot molten slag will cause it to give up or radiate its heat more rapidly, so that after it has been rotated around once on the table or floor to the place of discharge it will have probably accomplished its purpose and be ready for removal.

To remove the slag from the floor or table after it has wholly or partially given forth or imparted its heat, I provide a carrier, E, which consists of a series of scrapers arranged on an endless chain or in any other convenient way, which passes through the walls of the slag-furnace, and which is rotated on two drums or shafts, *d d'*, supported in a frame, *f*, riveted or otherwise fastened to the walls of the slag-furnace and extending out toward the middle of the same, as shown in Figs. 2 and 5. As this removing-carrier rotates, it will scrape the slag from the floor or table as it is delivered to it by the rotation of the table. The slag thus removed from the floor or table can be dropped into a receptacle, R, in which an elevating carrier, F, may be arranged, as shown in Fig. 5, whence it may be carried and discharged in a car to admit of its being removed or taken away. In Fig. 2 I have shown a shaft, S, which, through a gear-wheel, revolves the shaft *s* to operate this elevating-carrier, and through a sprocket-chain, *s'*, to rotate the shaft *d'*, which operates the removing carrier E. The rotation of this shaft *d'* rotates another shaft, and with it the drum or mop G. (Shown in Fig. 2.) This drum or mop G is fastened to a frame, *g'*, bolted or otherwise fastened to the inside wall of the slag-furnace, as shown in Fig. 2. It is located close to the removing-carrier E and beyond it in the direction of the rotation of the table, so that the table passes under it immediately after passing

under the removing-carrier E. A spout or pipe, *g*, enters the furnace between the removing-carrier E and the drum or mop G, through which a stream of thin mud or other material may be discharged on the table. As the table passes under the drum or mop G, this mud or "wash," as it may be termed, will be spread on the table, so as to furnish it with a thin coating to protect it from the intense heat of the hot molten slag and to prevent the slag from adhering thereto.

Around the removing-carrier E and the mud drum or mop G may be arranged a case, T, to cover and protect them, with an opening or space at one side under it (marked *t*) to admit the slag as the table rotates, so that it can come within the reach and operation of the removing-carrier E. As the removing and elevating carriers, the mud-drum, and the means for rotating them are clearly shown in Figs. 2 and 5, and as the novelty of my invention does not consist in the particular means employed for rotating these carriers and drum, they need not be further described in detail.

Above the walls surrounding the slag-table, and resting upon them, if desired, I arrange a tubular boiler with hollow heads H and water-tubes I running back and forth between these heads. By reference to Fig. 2 it will be seen that these tubes are arranged in a series or coil, so to speak, so that water in them may circulate back and forth through them and the heads H. These tubes are provided with spaces between them, as shown in Figs. 1 and 3, so that the heat thrown off by the molten slag on the floor or table passes up freely between them, as shown by the arrows in Fig. 1. The arrangement of these tubes and heads may be in the ordinary way on which tubular boilers are constructed. If preferred, however, instead of tubes, a shell-boiler with its tubes extending up vertically through it may be employed. The boiler is preferably covered or inclosed, and in Fig. 1 this inclosing wall or cover is indicated by the dark line A'. At the top of the tubes may be located a pipe, J, to carry the live steam as generated to the cylinder or case where it is to be used, as in ordinary boilers. From the top of the inclosure or cover a pipe, K, preferably provided with branches, as shown in Fig. 4, leads back to the fan or force-blower, so that the heated air passing up through the tubes of the boiler may be drawn off and carried down through the fan or blower and again driven into the slag-furnace into contact with the molten slag. A pipe, K', connecting with the pipe K, is, however, provided, and a valve, *k*, arranged therein, so that this heated air can be shut off from the fan or blower and discharged, if desired.

In Fig. 2 I have shown a fire box or chamber, F', which may be located outside the slag-furnace, with an opening communicating into the same, so that if there should be an insufficient quantity of hot or molten slag at any time an auxiliary fire may be obtained to re-

enforce or assist the operation of the slag-furnace in producing the necessary heat for the generation of steam.

5 By "slag" I mean not only what is technically known by that designation, but any heated material or refuse that is allowed to cool without its heat being utilized about smelting-furnaces, factories, &c.

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

1. In a slag-furnace, the combination of a steam-generating boiler, a slag-holding table adapted to rotate horizontally, and means for rotating the same, substantially as described.

15 2. In a slag-furnace, the combination of a steam-generating boiler, a slag-holding table underneath the same, and a slag-removing device whereby the table is cleared of the slag after imparting its heat, substantially as described.

20 3. In a slag-furnace, the combination of a slag-holding table, a pipe or spout discharging a wash thereon, and a mop or roller for spread-

ing the same over the surface of the table, whereby the slag is prevented from injuring 25 the table or adhering thereto, substantially as described.

4. In a slag-furnace, the combination of a slag-holding table, a slag-removing device, a wash-spreading mop or roller, and a boxing 30 inclosing the carrier and mop, substantially as described.

5. In a slag-furnace, the combination, with a steam-generating boiler, of a slag-holding table and an air-blast pipe discharging a blast 35 or current of air upon the slag while on the table, substantially as described.

6. The combination, in a slag-furnace, of a steam-boiler and slag-holding table and an auxiliary fire chamber or box to re-enforce and 40 assist the heat of the slag, substantially as described.

ORRIN B. PECK.

Witnesses:

THOMAS A. BANNING,
GEORGE S. PAYSON.