

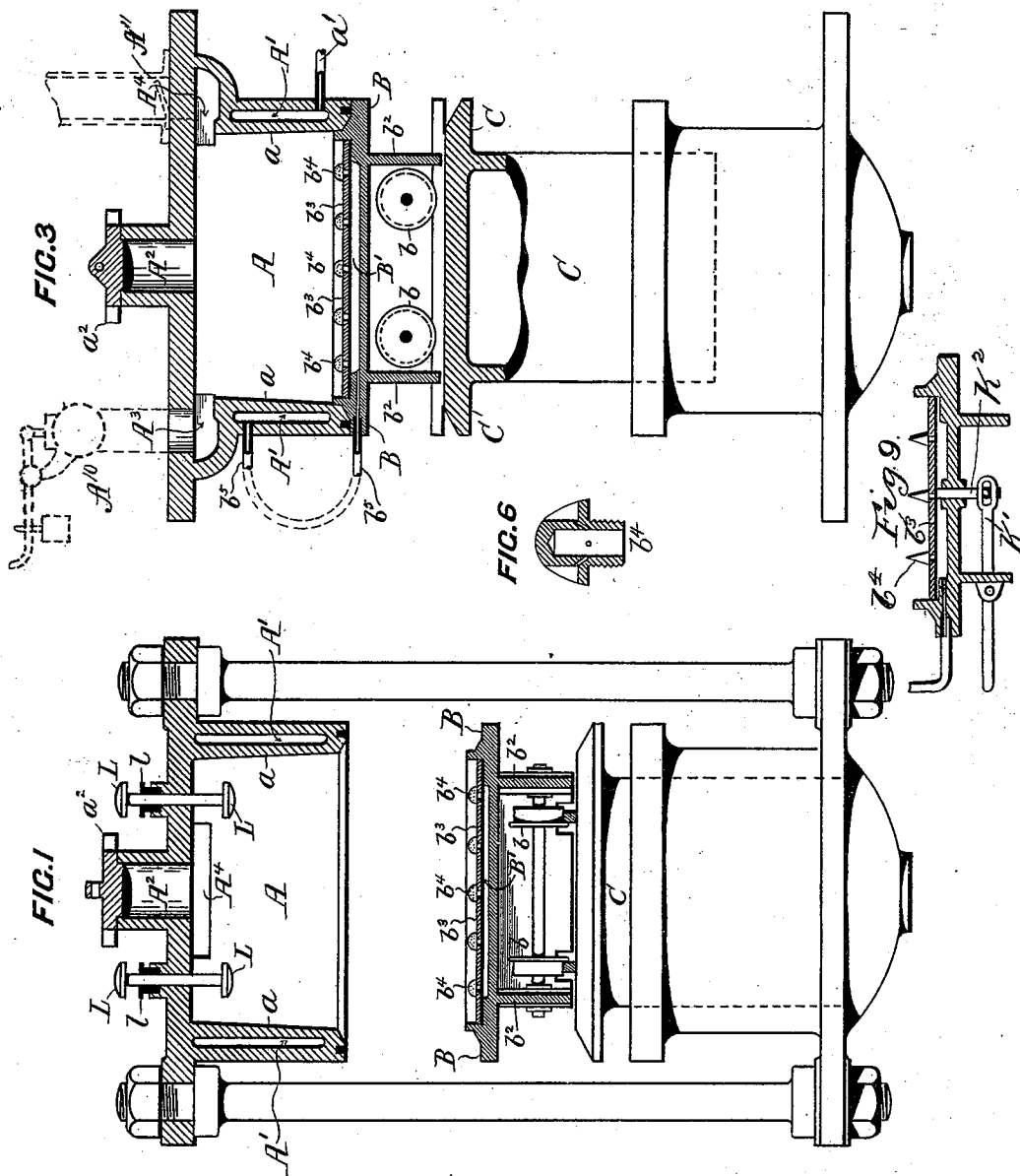
(No Model.)

2 Sheets—Sheet 1.

E. A. ASHCROFT.
APPARATUS FOR GENERATING STEAM BY THE AID OF MOLTEN SLAG.

No. 510,395.

Patented Dec. 12, 1893.



Inventor:

Edgar Arthur Ashcroft

By

Richardson & Co.

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E. R. Bolton

E. K. Sturtevant.

(No Model.)

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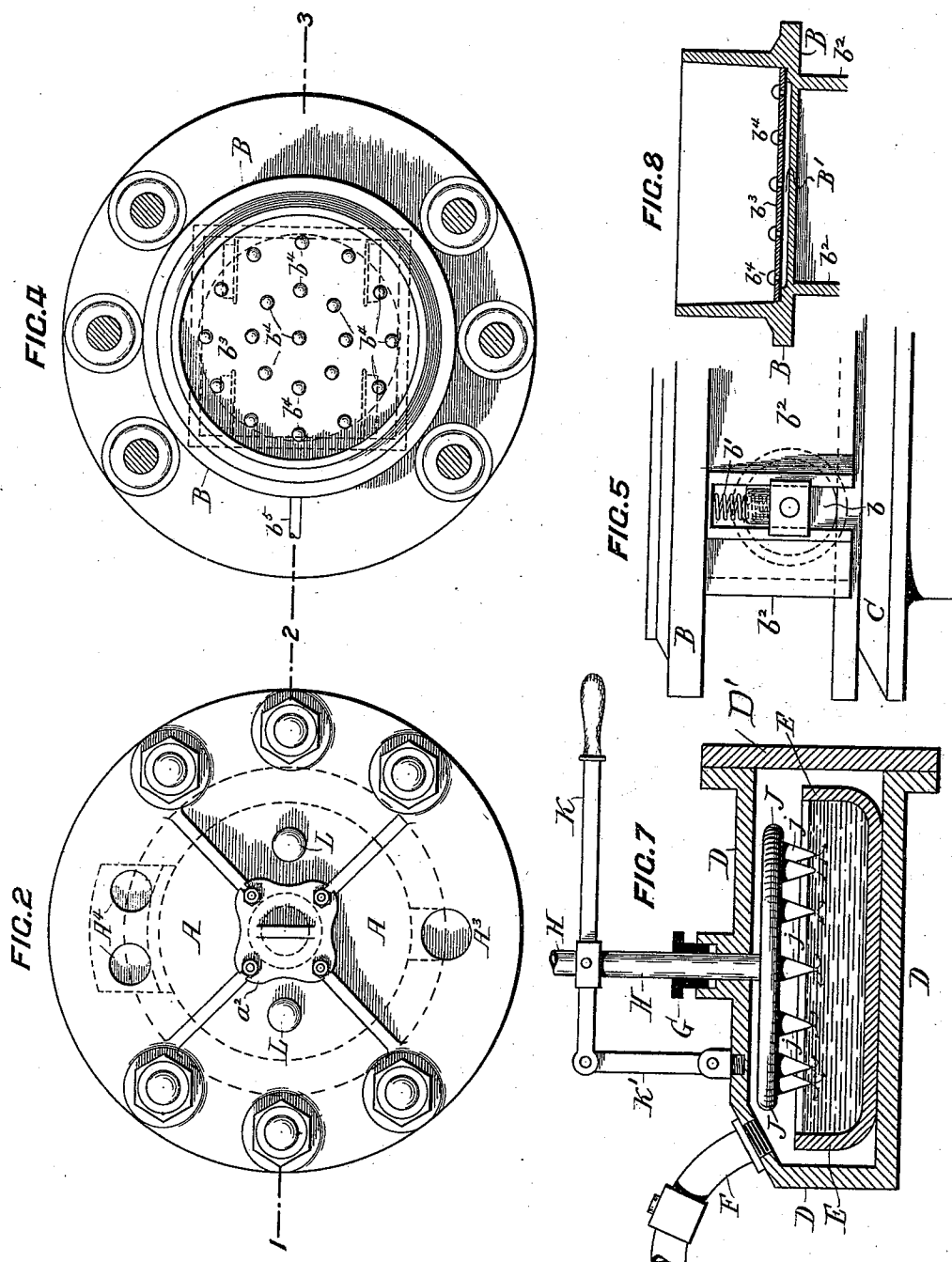
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UNITED STATES PATENT OFFICE.

EDGAR A. ASHCROFT, OF BROKEN HILL, NEW SOUTH WALES.

APPARATUS FOR GENERATING STEAM BY THE AID OF MOLTEN SLAG.

SPECIFICATION forming part of Letters Patent No. 510,395, dated December 12, 1893.

Application filed October 24, 1892. Serial No. 449,826. (No model.)

To all whom it may concern:

Be it known that I, EDGAR ARTHUR ASHCROFT, electrical engineer, a subject of the Queen of Great Britain and Ireland, and a resident of Broken Hill, in the Colony of New South Wales, have invented an Improved Mode of and Apparatus for Generating Steam by the Aid of Molten Slag from Smelting and other Furnaces, of which the following is a specification.

By referring to the accompanying drawings, the particulars of the invention may be more readily understood.

Figure 1 is a vertical section of the apparatus, the lower part or hydraulic ram being in elevation; the section is taken on the line 1—2 of Fig. 2, which is a plan view of Fig. 1. Fig. 3 is a vertical section similar to Fig. 1, but is taken on the line 2—3 of Fig. 4, which latter is a plan view of Fig. 3, but with the superstructure or slag chamber removed, showing in plan view the movable bottom of the slag chamber. Fig. 5, is a detail view of the wheel bearing, on the movable bottom. Fig. 6, is a sectional detail of the water supply nipple. Fig. 7, is a modified form of apparatus. Fig. 8, is a detail view of a modified form of the movable bottom. Fig. 9, is a detail view of the manner of making the nozzles of Fig. 1 movable. Fig. 9 shows this arrangement in which the plate carrying the nozzles may be operated vertically by the lever K' connected to the depending post K² of the plate.

A, is the slag chamber, that is, in the form of apparatus here illustrated, provided with a movable bottom B. The inner face of the wall *a*, of the slag chamber A, is tapered, to allow the slag to be easily removed when cool. Two rammers, L, consisting of iron rods moving freely in a vertical direction through packing glands *l*, in the upper part of chamber, are provided to assist in removing the cooled slag. The walls *a*, are constructed with an annular water jacket A', whereby they are protected, and the water contained in the jacket A', heated, previous to its introduction into the slag chamber A.

The top of the slag chamber A, is provided with a central aperture A², through which the molten slag is admitted to the chamber. The

aperture A², may be sealed or closed in any suitable and convenient manner, the means shown in the drawings consisting of a plate *a*², secured in position by bolts.

The slag chamber A, is provided with a steam outlet A³ to which a safety valve A¹⁰ should be fitted, and with steam outlets A⁴, which should be provided with check valves A¹¹ and pipes to convey the steam to its work. The lower edge of the slag chamber A, should be faced or so constructed as to form a tight joint with the movable bottom B. The movable bottom B, may be mounted on wheels *b*, for convenience of handling, and may be worked in conjunction with a hydraulic ram C. The axles of the wheels *b*, are elastically mounted, as shown in Fig. 5, which is a detail side elevation, on an enlarged scale, of the manner in which the axles of the wheels *b*, may be elastically mounted: viz: they are provided with springs *b'*, which are so arranged as to give way when a certain pressure is brought to bear in the axles.

When the slag chamber A, is to be charged, the movable bottom B, is to be run on to the ram head C; the ram is then run up, until the bottom B comes in contact with the lower edge of the slag chamber A, any suitable packing being introduced to secure a steam tight joint (see the position shown in Fig. 3). On further application of power to the ram, the springs *b'*, on the axles, will be compressed, thus bringing the cheeks or side frames *b*², into contact with the head of the ram, and thus causing the movable bottom B, to directly receive the full thrust of the ram, and make a tight joint with the slag chamber A.

The movable bottom B, may be recessed so as to form a shallow water chamber B', that should be covered by a perforated plate *b*³, that is preferably constructed of wrought iron and provided with nozzles *b*⁴, a section of which, on an enlarged scale is shown at Fig. 6. Water is admitted to the chamber B', through the inlets *b*⁵ which may be placed in communication with the water jacket A', by means of a flexible junction or other device, for the purpose of supplying the water chamber B', with hot water from the water jacket. *a'*, is the inlet to the water jacket. The water that is passed through the water jacket A', to the

water chamber B', must be under pressure. The bottom of the slag chamber having been hermetically sealed, as described, the cap a^2 may be removed, and the molten slag introduced to the slag chamber through the aperture A². When a sufficient quantity has been admitted the cap should be replaced and secured, and the water admitted to the chamber B', from whence it will be forced through the nozzles into the body of the molten slag in the chamber, and will thus be converted into steam. Instead of the movable bottom being a mere slab, as shown in Fig. 1 it may be made in the form of a pot or receptacle, as in Fig. 8 and the slag not introduced into the slag chamber through the opening A² as before described but into the pot so formed and afterward placed in the chamber.

The above description illustrates one mode of introducing the water to the molten slag from the bottom of the mass. Fig. 7 shows a mode of introducing the water into the body of the mass by means of jets descending from the top and a different construction of chamber whereby the hydraulic apparatus is dispensed with and a hermetically closing door D' substituted. In this figure, D is a hermetically closed chamber into which is introduced a pot E, of molten slag. F is the steam outlet and check valve. G, is a gland through which passes a pipe H, the lower end of which terminates in a flat water chamber J, the under side of which is perforated and provided with holes or conical nozzles $j j$, through which water will be forced into the mass of molten slag. By means of the lever K K', the water chamber J, and nozzles $j j$ may be raised and lowered at will, and the points of the nozzles be either raised from contact with, or lowered beneath the surface of the molten slag in the pot.

It will be readily understood that the movable nozzles, shown in Fig. 7, may be used with the apparatus shown in Fig. 1.

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 is—

1. In a steam generating apparatus the chamber for containing the slag, hermetically closed and having a bottom provided with water inlet ports whereby water can be introduced into the body of the mass of molten slag from the under side thereof, and the steam

outlet pipe from the slag chamber substantially as described.

2. In combination, the steam chamber having an outlet pipe, the vertically movable bottom fitting against the lower edges of the chamber and the supply pipe for the water, leading to the bottom, substantially as described.

3. In combination, the steam chamber having a steam outlet pipe, the movable bottom upon which the slag rests and the water supply pipe leading to said bottom, substantially as described.

4. In combination, the steam chamber having a steam outlet pipe, the water supply pipe, the movable bottom operating vertically and the truck wheels journaled on the bottom frame, the said steam and water pipes communicating with the interior of the steam chamber substantially as described.

5. In combination, the steam chamber the movable bottom operating vertically and having truck wheels carried in yielding bearings, the rigid cheeks depending from the bottom the means for moving the bottom vertically, and the water inlet pipe and steam outlet pipe communicating with the chamber substantially as described.

6. In combination, the steam chamber having the jacket and adapted to contain the molten slag, the supply pipe for the water leading to said jacket and the connection between the said jacket and the interior of the chamber, said chamber having a steam outlet, substantially as described.

7. In combination, the chamber having the steam outlet and adapted to receive the slag and the series of nozzles connected with the water supply and adapted to enter the molten slag, substantially as described.

8. In combination, the chamber adapted to receive the slag and having a suitable steam outlet, the water supply pipe and the movable nozzles with means for operating the same to cause them to enter the slag, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

EDGAR A. ASHCROFT.

Witnesses:

ARTHUR F. ABBOTT,
Notary Public, Broken Hill.

W. R. CHILMAN,
Law Clerk, Broken Hill.