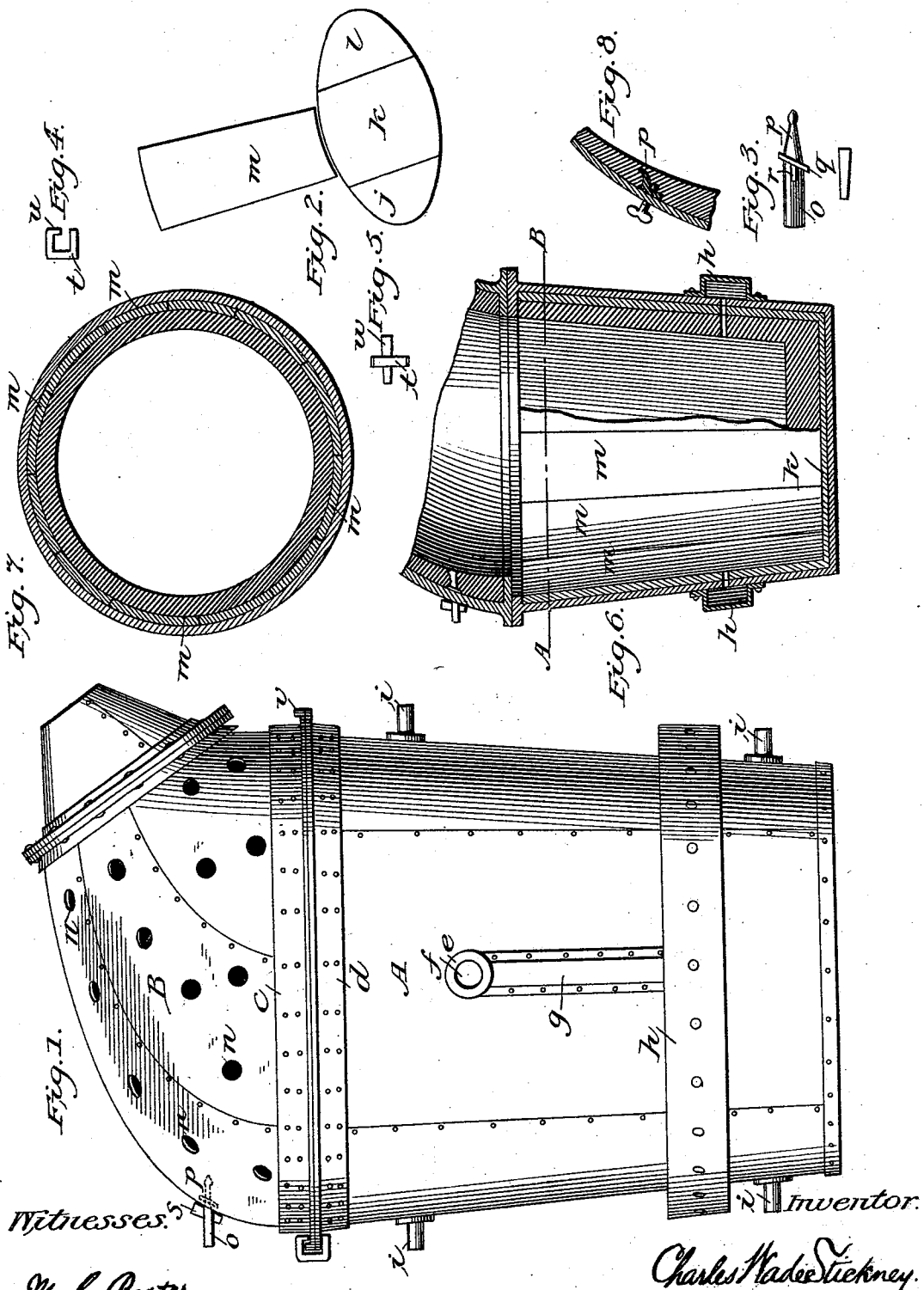
(No Model.)

C. W. STICKNEY.

CONVERTER.

No. 517,939. Patented Apr. 10, 1894.



THE NATIONAL LITHOGRAPHING COMPANY.
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES WADE STICKNEY, OF BUTTE, MONTANA.

CONVERTER.

SPECIFICATION forming part of Letters Patent No. 517,939, dated April 10, 1894.

Application filed September 16, 1892. Serial No. 446,122. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WADE STICKNEY, a citizen of the United States, residing at Butte, in the State of Montana, have invented certain new and useful Improvements in Copper-Converters, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention is a particular form of converter, used for converting copper matte to pig copper, and also three attachments thereto made as improvements, to facilitate the handling of the converter and its lining.

The first invention consists in making the converter in two parts, easily separable from each other, namely, the hood and the body, and in forming the body of a taper form, from the hood downward.

The first improvement consists in a metallic lining to the body, made in sections, forming false sides and bottom of the converter, easily separable from the body of the converter.

The second improvement, consists in pins or catches extending through the metal of which the hood is made from the outside to the inside, made adjustable, so as to be readily removed when the hood needs re-lining, the portion projecting inside, when in place, forming the catches for the lining.

The third improvement, consists in a device which I call clamp and wedge, for holding the hood to the body, so made as to allow an easy and rapid separation of the two parts.

These four devices though capable of being used separately with more or less efficiency, have but one object and mutually contribute to a single result, viz: the quick and easy removal of the quartz and clay lining of the converter, when it has become worn beyond usefulness.

In the drawings, Figure 1 represents the complete converter. Fig. 2 represents the false bottom and one section of the false sides. Fig. 3. represents the hood pin with its catch in one piece and the wedge used for fastening it in its place. Fig. 4. represents a clamp unfastened from the body of the converter; and Fig. 5. shows the clamp and wedge, front view. Fig. 6 shows a longitudinal section of the whole converter and the arrangement of the refractory lining and false sides. Fig. 7. shows a horizontal section of the lower part of the converter on the line A. B. of Fig. 6, with the false metal lining and the refractory lining in place. Fig. 8 shows a modified construction of the lining catches.

The construction is as follows:—The main body is made of three-sixteenths inch steel boiler plate and its internal form, which is the important part of the invention, is the frustum of a cone. The smaller end or bottom, has a diameter of four and one-half feet. The upper rim has a diameter of five and one-half feet. The upper rim of the body has a heavy flange riveted around the outside, which, in connection with a similar flange on the hood, serves to connect the hood to the body.

Slightly below the center of gravity of the whole converter and attached to the body externally on both sides are two trunnions upon which the converter swings, one of which has a hole, *f*, through it longitudinally, communicating in the usual manner through the wind passage *g*, with the wind chest *h*. The four studs marked, *i*, are formed of cast iron with a flange and riveted to the body externally, for convenience of handling by crane. The false bottom of the body is made of one-eighth steel boiler plate in circular form and in three sections like the head of a flour barrel, *j*, *k*, *l*, Fig. 2, and false sides are made of the same material, in sections, like, *m*, similar to the staves of a barrel, but having the upper width greater than the lower, and these are made of the same length as the internal depth of the converter body. The hood is pierced with holes, *n*, *n*, &c., Fig. 1. A wrought iron pin, *o*, round at one end and having the other end, *p*, formed somewhat taper with a pointed head, is shown in Fig. 3. The two parts, *o*, and, *p*, are separated by a shoulder, *q*, and in the part, *o*, there is a taper slot, *r*, and into this slot a wedge, *s*, is made to fit, loosely. The part, *o*, fits the holes, *n*, and the shoulder, *q*, will not go through the hole. The part *o*, is passed through the hole from the inside of the hood until the shoulder, *q*, arrests it, and the slot, *r*, then being on the outside, receives the wedge, *s*, and this is driven in until it holds the pin tightly in place. The clamps are made as

shown in Figs. 4. and 5. A steel bar, about one inch square is bent in the form of an E, (*t*,) one arm having a lip, *u*. On the flange attached to the hood there is a small projection shown at *v*, Fig. 4. When the clamp is placed on the edge of the flanges, *c* and *d*, Fig. 1, the wedge, *w*, is inserted between the clamp and the flange, and between the projections, *v*, on the flange, and *u*, on the clamp and driven in, snug. As many of these clamps are used around the flange edges as are thought necessary to secure the hood to the body, say about six inches apart.

The working and purpose of these devices are as follows:—The converter is picked up by a steam crane and landed on the floor. The wedges, *w*, are driven out from the clamps, *t*, and these fall off. The hood, B, having the pins, *o*, in place, is lifted off and turned over, concave side up. The inner surface of the converter body and both surfaces of the false bottom, *j*, *k*, *l*, and the false sides, *m*, may be polished with powdered graphite to reduce friction and make the sections easily detachable from the quartz and clay lining. The false bottom *j*, *k*, *l*, and the false sides, *m*, are now placed in position, sufficient in number and size to completely cover the inner surface of the body of the converter. The interior is then lined with the quartz and fireclay lining, in the usual way. The hood is also lined with the same material in its plastic condition with the catches, *p*, projecting into the interior. The top of the wall of plastic lining of the body is sanded, or sprinkled with powdered graphite, to give an easy breakage line after the lining has been baked. The hood, B, is picked up by the crane, turned over and placed on the body, A. The clamps are placed around the flange edges and their wedges driven home, fastening the parts, A, and B, securely together. The converter is now picked up, placed on its carriage, rolled to place, and swung on its trunnions in the usual way.

My invention comes into play in about six hours, when the lining has become so eaten out, in places, as to require a renewal. The converter is landed on the floor, hot, and no time is lost in cooling it. The wedges, *w*, are driven out from the clamps, *t*, and the latter fall off. The hood, B, is picked up by the crane and lifted from the body, and placed on an iron frame work about two feet high. The body, A, is seized by the crane turned bottom upward and then lifted an inch or two from the iron or stone floor, when the hard baked lining together with the false sides and bottom, slide out. The body, A, is then sprayed with water for a few minutes and being of thin material, it does not retain the heat long. It is then given another set of false lining plates, immediately re-lined with plastic material, and is ready for use. If the hood also needs re-lining, the wedges *s*, which hold the pins, *o*, are driven out and, with a sledge, the pins, *o*, are driven inward, breaking up the lining which falls in chunks through the frame upon the iron floor. The hood is then sprayed just sufficient to make the heat bearable by the workmen. Cold pins are then put in place, the lining done in the usual way and the hood is ready for use again.

The hollow frustum of hard baked lining dumped from the body, and internally red hot, and having the metal lining adhering to the outside, is broken up while hot, with much more ease than when cold. For this purpose the dumping is done in a small apartment made of boiler iron with a solid floor of stone covered with an iron plate, into which apartment the crane has landed the converter body and turned it upside down as before described. When the shell of the converter body is lifted out of this apartment, the sections of metal lining are jarred off with a sledge and removed. The crane then elevates a large mass of solid iron and lets it drop on the lining after the manner of pile driving, and this is repeated, if necessary, to make the pieces small enough to handle. These pieces are then sprayed until sufficiently cold for handling.

My invention enables the lining to be removed and broken up while hot with great ease, and avoids the long delay and tedious hand labor heretofore required in cooling both converter and lining, and then picking out the cold and almost adamantine mass, formed by the quartz and fireclay, hard baked and cemented by metallic particles, which work into it, while melted, for several inches.

Nothing is new in the converter above described except the taper form, the false bottom and sides, the removable catches holding the hood lining, and the method of joining the hood to the body by clamps and wedges.

The form of the frustum of a pyramid of any number of sides, might be substituted for the frustum of a cone, also a modified cone or pyramid, similar to a coffee cup, with the same result, and as the equivalent. The false sides and bottom may be dispensed with, provided a substance is found which, when used to coat the interior of the body, will prevent the plastic lining from sticking to the body, after baking.

When the false sides are used they must be pierced with holes immediately in front of and corresponding to the tuyere holes in the shell of the converter, as shown at *x* in Fig. 6.

I do not confine myself to the particular form of the catches described, nor to the method of securing them;—for instance, the part, *p*, may be made of any convenient form and the part, *o*, extend through the hood shell and screw into the part, *p*, so that upon unscrewing all the pins, the whole hood lining may fall out together, with the catches still embedded in it, and the latter removed by breaking up the lining.

Having described my invention, I claim—

1. A separable swinging converter having tuyere holes leading therein through its sides above the base, and having a form increas-

ing in its internal periphery from the base upward, and provided with false sides made in longitudinal sections and removable substantially as described.

2. A separable swinging converter having tuyere holes leading therein through its sides above the base, and having a form increasing in its internal periphery from the base upward, and provided with a loose false bottom made in sections and removable, substantially as described.

3. A separable swinging converter, having tuyere holes leading therein through its sides above the base, and having a form increasing in its internal periphery from the base upward, and provided with a coating of non-adhesive material between the converter body and its refractory lining substantially as described.

4. In combination with a converter, removable lining catches, projecting through the converter shell into the space occupied by the refractory lining material, substantially as described.

5. In combination with the connecting flanges of the parts of the converter, the clamps, *t*, held in place by the wedges, *w*, and the two projections, *v* on the flange and *u* on the clamp, substantially as described.

6. In combination with a separable converter and its refractory lining, one or more breakage lines in said lining formed by non-adhesive material placed in said lining before baking, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES WADE STICKNEY.

Witnesses:

G. I. STICKNEY,

FRANK STEPHENS.