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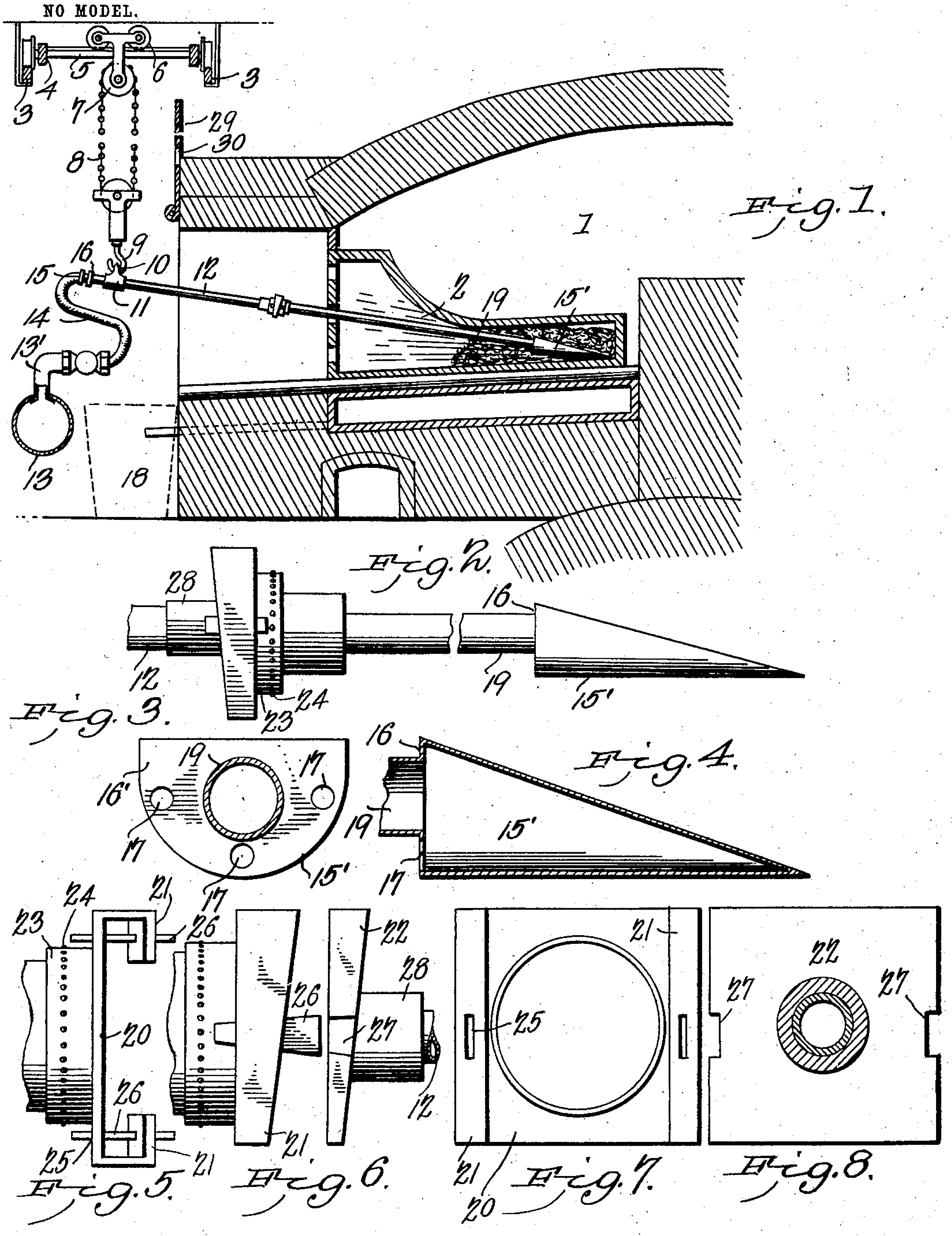
T. JONES.

APPARATUS FOR CLEANING FURNACES.

APPLICATION FILED MAR. 10, 1903.

NO MODEL.



Witnesses

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No. 742,197. Patented October 27, 1903.

UNITED STATES PATENT OFFICE.

THOMAS JONES, OF IOLA, KANSAS.

APPARATUS FOR CLEANING FURNACES.

SPECIFICATION forming part of Letters Patent No. 742,197, dated October 27, 1903.

Original application filed September 10, 1902, Serial No. 122,889. Divided and this application filed March 10, 1903. Serial No. 147,105. (No model.)

To all whom it may concern:

Be it known that I, THOMAS JONES, a citizen of the United States, residing at Iola, in the county of Allen and State of Kansas, have invented a new and useful Apparatus for Cleaning Furnaces, of which the following is a specification.

This invention relates to apparatus for cleaning out furnaces, and while capable of use in connection with furnaces of various construction is particularly adapted for use in connection with zinc or spelter furnaces of that general type illustrated in an application for Letters Patent of the United States filed by me on the 10th day of September, 1902, under Serial No. 122,889, and of which the present application is a division.

The invention relates more particularly to a cleaner in which a jet or blast of air or other fluid is used for removing or cleaning the retorts or muffles of zinc or spelter furnaces of the spent or old charge, which has been subjected to complete reduction preparatory to introducing a new charge.

The invention has for its primary object to produce a device of this character which is simple in construction, efficient in operation, and which will materially reduce the cost of cleaning retorts under the systems or methods now in use, which will dispense with skilled and expensive labor now necessary in doing work of this kind, and permit the work to be accomplished more quickly and more accurately than heretofore.

A further object of the invention is to provide means whereby the spent charge or slag may be removed by means of a blast of air introduced through the medium of a novel form of injector to the interior of the retort or muffle, causing the slag or reduced charge to be blown out and deposited in a residuum-hopper, where it may be removed when detired for final disposition.

A still further object is to provide means whereby the cleaning-out operation may be effected without injury to the operator or without cracking or breaking the retorts or muffles, as is often the case when a jet of steam is employed, thereby materially lengthening the life of the retorts.

The invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended.

Referring to the drawings, Figure 1 is a view in sectional elevation of a muffle-furnace having my improved cleaner applied thereto and showing the manner of cleaning out or removing a spent charge. Fig. 2 is a view in elevation of the cleaner. Fig. 3 is a view in elevation, partly in section, taken from the rear of the cleaner-head. Fig. 4 is a view in longitudinal section through the cleaner-head. Fig. 5 is a top plan view of the coupling. Fig. 6 is a collective detail view showing the manner of coupling the injector or cleaner with the fluid-supply pipe. Fig. 7 is a view in end elevation of the injector, showing the coupling; and Fig. 8 is a similar view of the forward end or coupling of the fluid-pressure pipe.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

1 designates a furnace of the usual type employed in smelting zinc or other ores provided with the usual retort or muffle 2. Arranged at a suitable distance above the furnace is a pair of tracks 3, which may be suspended in any preferred manner from the ceiling of a room or otherwise. Upon these tracks is mounted a wheeled platform or carrier 4, to the frame of which is connected a section of track 5, disposed at right angles to the front of the furnace, and on this track is mounted a trolley 6 of any preferred construction, carrying at its lower end a sheave 7, from which is suspended a set of differential chain hoists 8, the chain being provided at its lower end with a hook or catch 9 to engage a ring 10, carried by a collar 11, adjustably mounted on a fluid-supply pipe 12, the wheeled platform, trolley, and differential chain hoist constituting, in effect, a chain hoist, by means of which the cleaner may be supported at the desired height or angle and moved from one muffle to another as the occasion demands.

Secured to or supported by the furnace in any suitable manner is a fluid-supply main 13, connected at one end with a suitable air-

compressor or other source of air under pressure, and the main is provided with valved branches 13′, which connect sections of hose 14, carrying coupling elements 15 to engage with the coupling 16 of the supply-pipe 12. The form of coupling herein shown is an ordinary hose-coupling; but any other form of device adapted for the purpose may be employed and still be within the scope of the invention.

The mechanism for effecting the cleaning out of the retort or muffler comprises a head 15′, approximately wedge-shaped in elevation and provided with a flat top and curved sides and bottom, as clearly shown in Fig. 3, the rear end 16′ of the head being provided with a plurality of openings 17, through which compressed air escapes to blow the contents of the muffle without the same, the spent charge being afterward scraped into a residuum hopper or receptacle 18 at the front of the muffle. The head has associated with it a pipe or extension 19, provided with a clutch member adapted to engage with a corresponding or interfitting clutch member or the fluid-supply pipe 12, as will be more fully explained hereinafter. One end of the pipe 19 has connected with it a plate 20, exhibited in detail in Figs. 5 and 7, each side of the plate being provided with an inturned flange that is disposed at an angle to the outer face of the plate, thus presenting wedge-shaped recesses to be engaged by a similarly-shaped head 22, carried by the fluid-supply pipe 12 of the cleaner. The plate 20 is herein shown as provided with a tubular extension 23, in which the outer end of the pipe 19 is seated, being secured therein by means of bolts or rivets 24, or the exterior of the extension may be screw-threaded and engage corresponding threads on the pipe 19, if desired, the manner of connecting the plate 20 and the pipe not being essential. The flanges 21, as also the plate 20, are provided with slots 25 to be engaged by a wedge-shaped locking-key 26, which when the head 22 is in position between the flanges engages recesses 27 in the sides thereof, thus to insure positive locked action between the parts, the recesses being clearly shown in Fig. 8. By the angular disposition of the inner faces of the flanges with relation to the plate 20 and by coaction between the outer wall of the head 22 and the flanges the said head will be tightly forced up against the plate 20, and thus preclude escape of air or other fluid employed in clearing the retort or muffle.

The manner of associating the supply-pipe 12 with the head 22 is in this instance effected by providing the latter with a tubular offset 28, in which the pipe is threaded or otherwise secured. By providing a coupling or clutch member of the character described it enables the cleaner or injector to be detached after the spent charge or reduced ore has been blown out, and my improved charging-cylinder shown and described in my former application above referred to may be coupled with the fluid-supply pipe 12 and a fresh charge introduced in the retort or muffle.

The pipe-main 13 may have connected therewith as many individual supply-pipes as there are muffles in the furnace, or, if preferred, one supply-pipe of sufficient length may be used to accommodate all the muffles.

As a means for protecting the operator during the blowing out or cleaning operation, I provide a metallic apron or sheet 29, provided with an opening 30 for the reception of the cleaner, which in its operative position closes the mouth of the furnace, forming a chamber for the ejected slag or reduced charge, which may afterward be scraped into the residuum-hopper 18.

In cleaning out the retort the extension 19 of the head is clutched to the air-supply pipe 12, the latter being supported from the chain hoist 8, as already explained, and the head thrust into the muffle and under the pile of slag therein. The operator then opens the valve of the air-supply pipe, and the air in escaping through the openings 17 in the head will blow the slag out through the openings at the front of the muffle and cause it to be deposited at the front of the furnace, where it may be subsequently scraped in the hopper 18, the operator being protected during the operation by the metallic apron 29, which is previously secured in position, closing the mouth or opening in the furnace. By reason of the wedge-shaped form of the head of the cleaner the bottom of the muffle may be scraped and relieved of any accumulated material, which will be readily removed in the manner described. It will be seen that under the arrangement disclosed rapid and thorough cleaning out of the retort may be effected with the expenditure of but a small amount of labor.

By using a jet or blast of air as the cleaning medium in lieu of steam or water the retorts or muffles are less liable to crack or break, as is the case when the latter agents are used, thereby considerably prolonging the life of the retorts.

By having the head of the scraping-tool or cleaner wedge-shaped the air or other fluid passing through the pipe 19 impinges the inclined wall of said head and is forced rearwardly through the openings 17, effectively removing the slag.

While I have shown the device applied to but one type of retort or muffle, it is obvious that the cleaner may be used with equally good results in any type of retort or muffle, and various changes in form, proportion, and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention.

Having thus described the invention, what I claim is—

1. A retort-cleaning device comprising a wedge-shaped scraping-tool provided with a

fluid-passage, and means for forcing fluid under pressure through said passage.

2. A retort-cleaning device comprising a hollow pointed tool having discharge-openings in its rear end, and means for forcing fluid under pressure through said tool.

3. An apparatus for cleaning retorts, comprising a movable pipe or conduit connected with a fluid-supply under pressure, and a wedge-shaped scraping-tool or cleaner secured to said movable pipe or conduit.

4. An apparatus for cleaning retorts, comprising a movable pipe or conduit connected with a fluid-supply under pressure, a scraping-tool or cleaner detachably secured to the movable pipe or conduit, said cleaner being provided with a wedge-shaped head having fluid-discharge openings in the rear end thereof.

5. An apparatus for cleaning retorts, comprising a pipe or conduit connected with a fluid-supply under pressure, a wedge-shaped scraping-tool or cleaner detachably secured to the pipe or conduit and an elevated carrier provided with differential hoisting mechanism associated therewith and adapted to support the injector.

6. An apparatus for cleaning retorts, comprising a pipe or conduit connected with an air-supply under pressure, a scraping-tool or cleaner having discharge-openings at its rear end secured to the pipe, and means for supporting the injector.

7. An apparatus for cleaning retorts, comprising a movable pipe or conduit connected with a fluid-supply under pressure, a scraping-tool or cleaner comprising a wedge-shaped shell having discharge-openings at its rear end detachably secured to the movable pipe or conduit, and an elevated carrier provided with differential hoisting mechanism associated therewith and adapted to support the injector.

8. An apparatus for cleaning retorts, comprising a pipe or conduit connected with a fluid-supply under pressure, and provided with a clutch mechanism, and a cleaner-head comprising a shell having discharge-openings at its rear end and provided with clutch mechanism to interlock with that of the pipe or conduit.

9. In a cleaning apparatus the combination with a retort, of an elevated carrier, a supply-pipe for a fluid under pressure, a scraping-tool or cleaner having discharge-openings at its rear end detachably secured to the supply-pipe and supported by the elevated carrier, and a shield arranged in advance of the mouth of the retort.

10. An apparatus for cleaning retorts, comprising a pipe or conduit connected with a fluid-supply under pressure and a scraping-tool or cleaner, one end of which is provided with a wedge-shaped head or shell having discharge-openings at its rear, the opposite end of the injector being provided with a perforated flanged plate adapted to receive a corresponding or interfitting perforated plate secured to one end of the pipe or conduit and means for detachably securing the plates together.

11. An apparatus for cleaning retorts, comprising a movable pipe or conduit connected with a fluid-supply under pressure, a scraping-tool or cleaner comprising a tube, one end of which is provided with a head or shell having discharge-openings, and the opposite end of the tube being provided with a perforated plate having inturned slotted flanges adapted to receive a corresponding or interfitting perforated slotted plate secured to one end of the pipe or conduit, and a key passing through the slots in the plates for locking them together.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

THOMAS JONES.

Witnesses:
A. SCOTT,
W. C. GRIMSCOTT.