(No Model.) 2 Sheets—Sheet 1.

G. W. GOETZ.

APPARATUS FOR REPAIRING FURNACE LININGS.

No. 436,976. Patented Sept. 23, 1890.

FIG. 1.

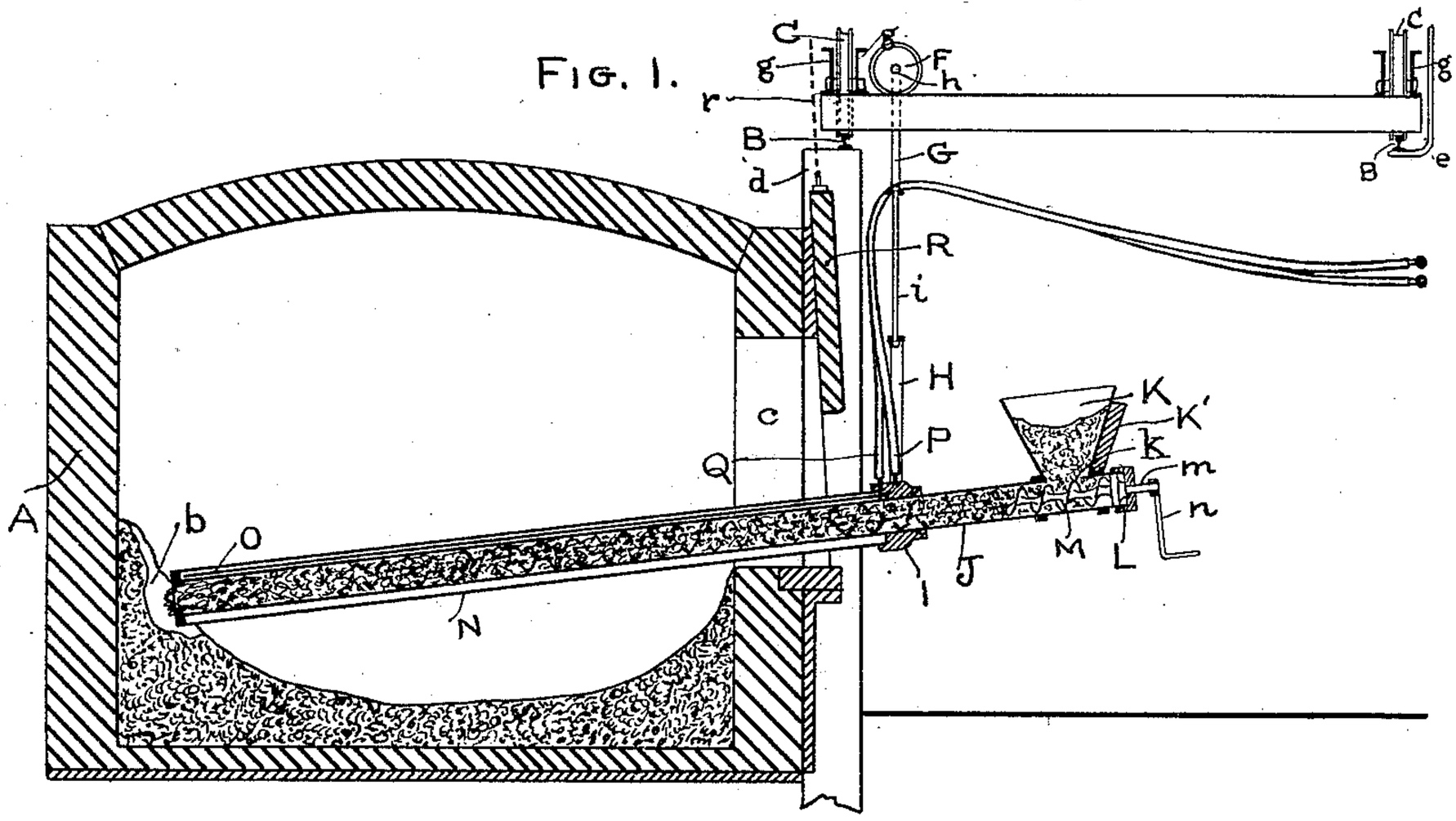
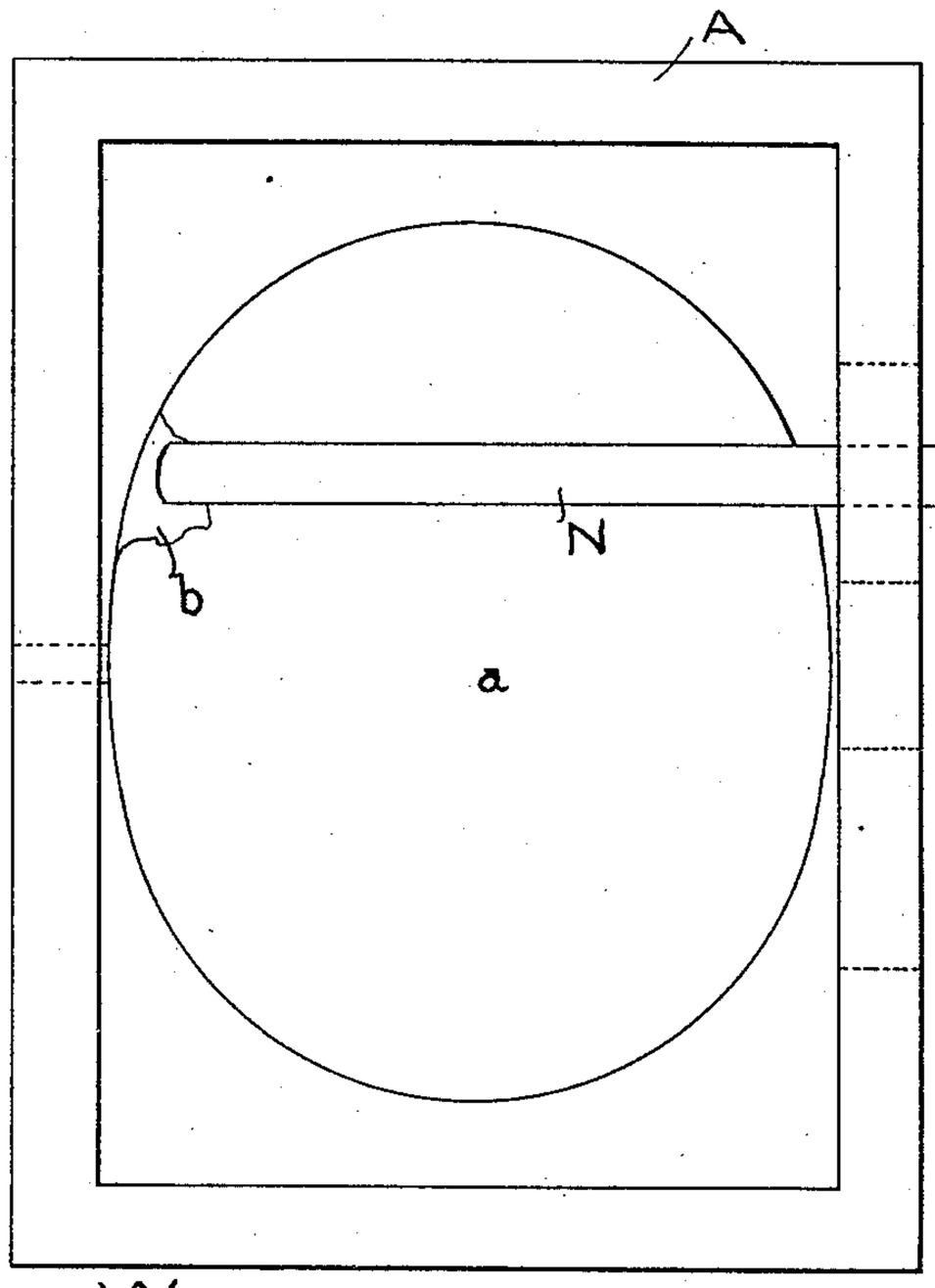
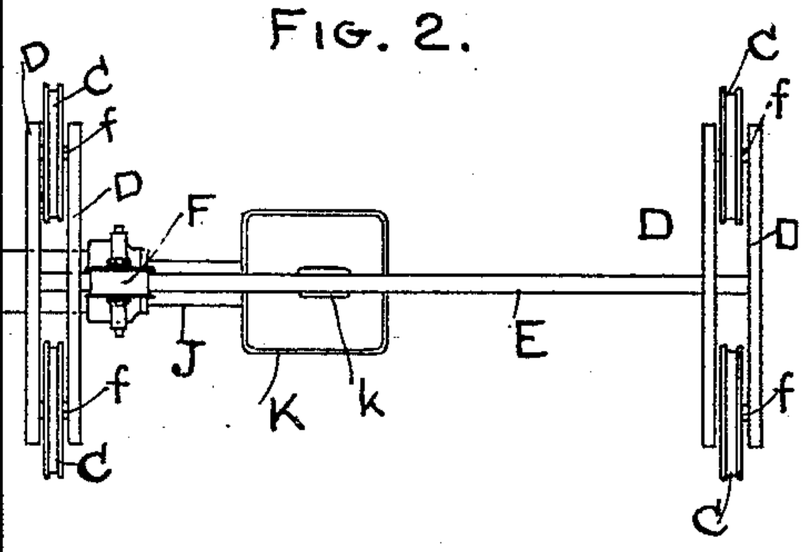


FIG. 2.





INVENTOR.
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By H. G. Underwood
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WITNESSES.
Lawson Scott
Wm Klug

(No Model.) 2 Sheets—Sheet 2.

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FIG. 3.

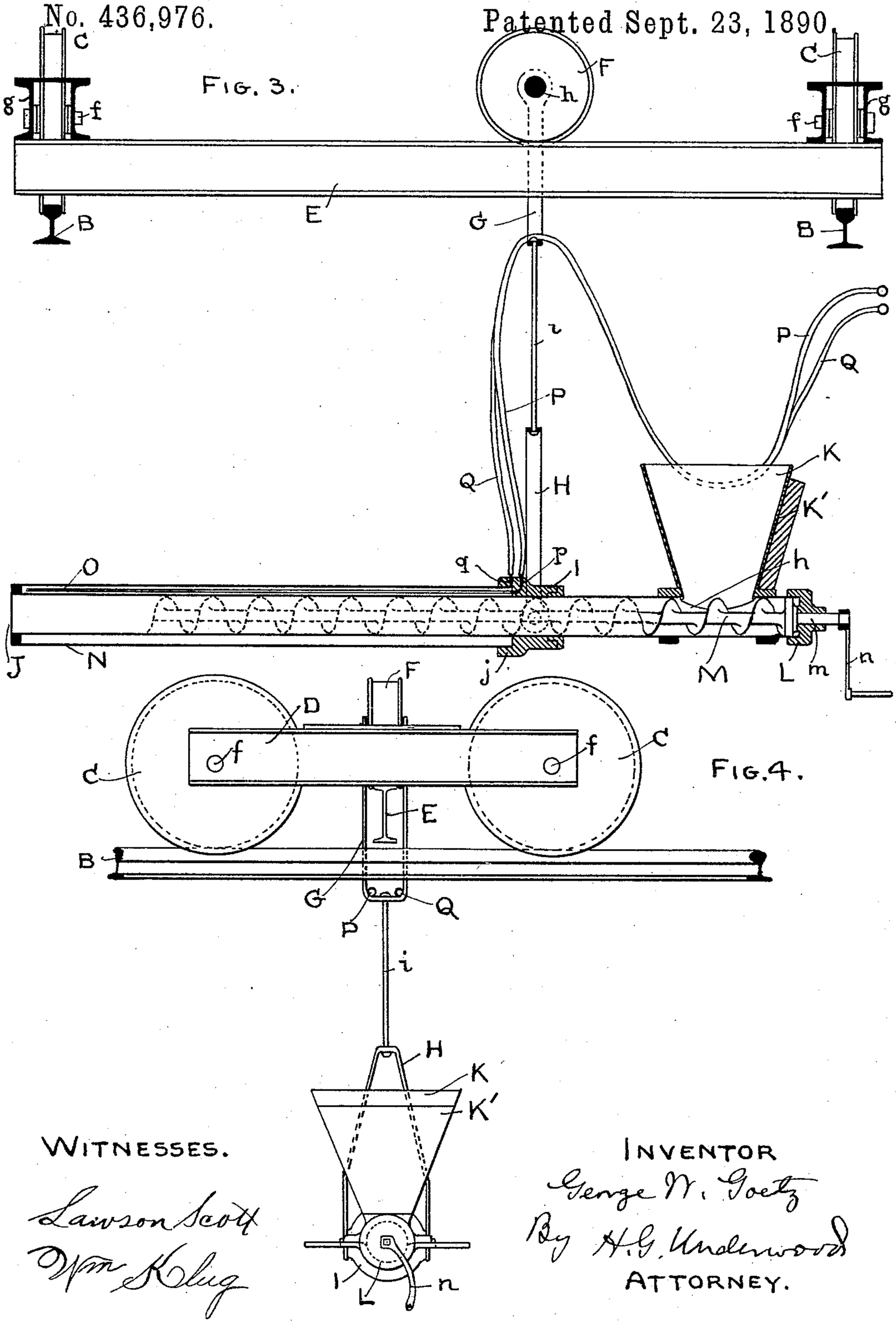

FIG. 4.

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UNITED STATES PATENT OFFICE.

GEORGE W. GOETZ, OF MILWAUKEE, WISCONSIN.

APPARATUS FOR REPAIRING FURNACE-LININGS.

SPECIFICATION forming part of Letters Patent No. 436,976, dated September 23, 1890.

Application filed June 2, 1890. Serial No. 353,949. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. GOETZ, of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Apparatus for Repairing Furnace-Linings; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to the repairing of furnace-interiors and similar places of difficult access; and it consists in a certain apparatus for accomplishing this result, as hereinafter fully set forth, and subsequently claimed.

In the drawings, Figure 1 is a sectional view of a furnace undergoing repair by means of my device, the latter being shown partly in section and partly in elevation. Fig. 2 is a plan view of the parts shown in Fig. 1, but with the top of the furnace removed. Fig. 3 is an enlarged view of the device, shown on a smaller scale in Fig. 1; and Fig. 4 is an end view of said parts.

In order to better illustrate the carrying out of my invention, I have shown a furnace A, the bottom of which is composed of lime or other refractory metal, arranged to form a concave bed or base, as shown at *a*, but which bed has been broken away at one point, as shown at *b*, remote from the doorways *c* of the furnace, and practically inaccessible by ordinary means. Heretofore in such instances the lime or other material to repair the broken or worn place has been thrown in by means of long-handled shovels, but not always successfully, and the injured place could not always be thoroughly restored without allowing the fire to go out and waiting until the furnace-interior was cool enough to be entered by a workman, thereby causing expensive delays and trouble, and to obviate all this and to afford a method and means for repairing such injuries without loss of time and while the furnace is still hot is the principal object of my present invention.

B B represent parallel rails or tracks supported on suitable bearings—such as posts and hangers *d e*—which may be either stationary or removable, (the latter being the preferred construction,) and which may form part of a suitable frame-work. On each of these tracks B is a pair of grooved wheels C C, connected together by straps D D, the axles *f* of said wheels being journaled in the ends of said straps, as shown.

E is a transverse rail or track suspended from the straps D, (as by means of suitable frames *g g*,) said transverse rail E extending from one pair of wheels C C to the other and above the plane of the rails B B.

F is a grooved wheel riding on the rail E, and from the axle *h* of this wheel F there depends a U-shaped hanger G, whose base is connected by a swivel-link *i* to an inverted-V-shaped hanger H, whose lower ends straddle and are pivotally connected to a centrally-perforated bearing-block I, having an annular shoulder *j* on its inner end surrounding said central perforation.

J is an open-ended pipe or tube passed through said perforation and projecting forward a sufficient distance to reach any point within the interior of the furnace or the place to be repaired, and also projecting rearward a suitable distance, and at its rear having an opening *k* in its upper surface, above and around which is secured a hopper K, preferably counterbalanced by weight K′. The outer or rear end of the pipe J is closed by a suitable cap L, centrally perforated to admit the passage therethrough of the shaft *m* of a spiral or screw conveyer M, located in the pipe J beneath the hopper K, and said shaft *m* is provided with a crank *n* or other suitable means for revolving said screw conveyer M.

N is a sleeve-pipe surrounding the inner portion of the pipe J and extending from just within the inner wall of the described annular shoulder *j* of the block I to the extreme inner end of the said pipe J, and there being closed, thus forming a jacket around the said inner portion of the pipe J.

O is a small pipe located within this space between pipes J and N, above pipe J, and extending to nearly the extreme inner end of said space, and the other end of said pipe O is connected to a channel *p* in the upper part of the block I, while the extreme inner end of said pipe O is open adjacent to the closed end of the jacket-pipe N.

P is a flexible tube communicating with the described channel *p* in the block I, and thence extended up over and resting upon

the base of the U-shaped hanger G, (the location only of this tube P on said hanger being shown at P in Fig. 4,) and thence continuing to a source of cold-water supply. (Not shown.) Another channel *q* is formed in the top of said block I, and the lower end of this channel *q* communicates with the space between the pipes J and N, while the upper end of said channel *q* communicates with another flexible tube Q, which, like the tube P, is carried up over said hanger G and rests thereon, as indicated by Q in Fig. 4, and thence continues out to any suitable point of discharge.

The operation will be readily understood from the foregoing description of the construction of my apparatus, taken in connection with the accompanying drawings. It will be understood in this illustration that a portion of the bed or bottom of the furnace is broken or worn away, as at *b*, and this is to be restored. Now the furnace is supposed to be hot, and the injured place is too far from the doors R to be conveniently reached by ordinary means. The nearest door R is raised by its chain *r*, as shown in Fig. 1, and the frame-work of my device brought conveniently near, when by means of the rails or tracks B B E and the wheels riding thereon the jacketed pipe J may be brought to place in front of the open doorway *c*, and its inner end run into the furnace to the required point, as shown in Fig. 1, and then the lime or other repairing material is fed into the hopper K, and by means of the screw conveyer M fed directly to the point needed, the swivel-link *i* and other described mechanism enabling the jacketed pipe to be turned or carried to every required point. Inasmuch as the furnace is hot, this could not be well and safely done were it not for the flexible tubes P Q, by means of which a constant circulation of cool water is maintained within said jacket around said pipe J, the cold water entering this jacketed space from the extreme inner end of the pipe O, adjacent to the closed end of the sleeve-pipe N, and flowing back around the pipe J and out through the channel *q* and tube Q to the point of discharge.

Heretofore by throwing in the repairing material by a shovel or otherwise dust was formed, which being basic injured the silicious roof of the furnace and was also carried over into the checker-work of the regenerative chambers, whereas by my present method and apparatus the repairing material is put at the desired place directly and without making any dust. Another disadvantage of the old method lay in the fact that by throwing in the material, as described, it often rolled down the sides and built up the bottom of the furnace, which is not desirable, whereas by my present invention the material is placed, as stated, exactly where it is required and in such manner that it will stay there and not roll down upon the furnace-bottom.

The conveyer M may either be short and located just beneath the hopper K, as shown in full lines in Fig. 3, or, if preferred, continued to near the opposite end of the pipe J, as indicated by dotted lines in said figure, the latter construction being preferable, when the repairing material is of such nature as to have a tendency to pack within said pipe.

In place of using the described form of conveyer the material may be conveyed through the pipe J by a piston actuated by hydraulic, pneumatic, or other force, if desired, and my method and apparatus are equally well adapted for repairing other kinds of furnaces as for the kind herein described and illustrated.

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

1. In an apparatus for repairing furnace-linings, the combination, with a suitable frame-work and rails or tracks supported thereby, of wheels moving on said rails and carrying a transverse rail or track, a wheel on the latter having a swiveled hanger, and a pipe carried by the latter and open at one end and provided with a hopper, feed-opening, and interior conveyer at the other end, substantially as set forth.

2. In an apparatus for repairing furnace-linings while the latter are in heated condition, the combination, with a suitable frame-work and rails or tracks supported thereby, of wheels moving on said rails and carrying a transverse rail or track, a wheel on the latter having a swiveled hanger carrying a channeled block, a pipe carried by said block and open at one end and provided with a hopper, feed-opening, and interior conveyer at the other end, a sleeve-pipe surrounding the inner portion of said first-named pipe and closed at each end, a pipe within the space between the two pipes open at its inner end adjacent to the closed inner end of the sleeve-pipe and communicating at its other end with one of the channels in said block, the other channel in said block communicating with the space between the two main pipes, and flexible fluid supply and discharge tubes communicating with said channels, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

GEORGE W. GOETZ.

Witnesses:
C. F. FRICKE,
CARL FELDTKELLER.