(No Model.)

F. BROWN.

BLAST FURNACE.

No. 323,634. Patented Aug. 4, 1885.

FIG. 1.

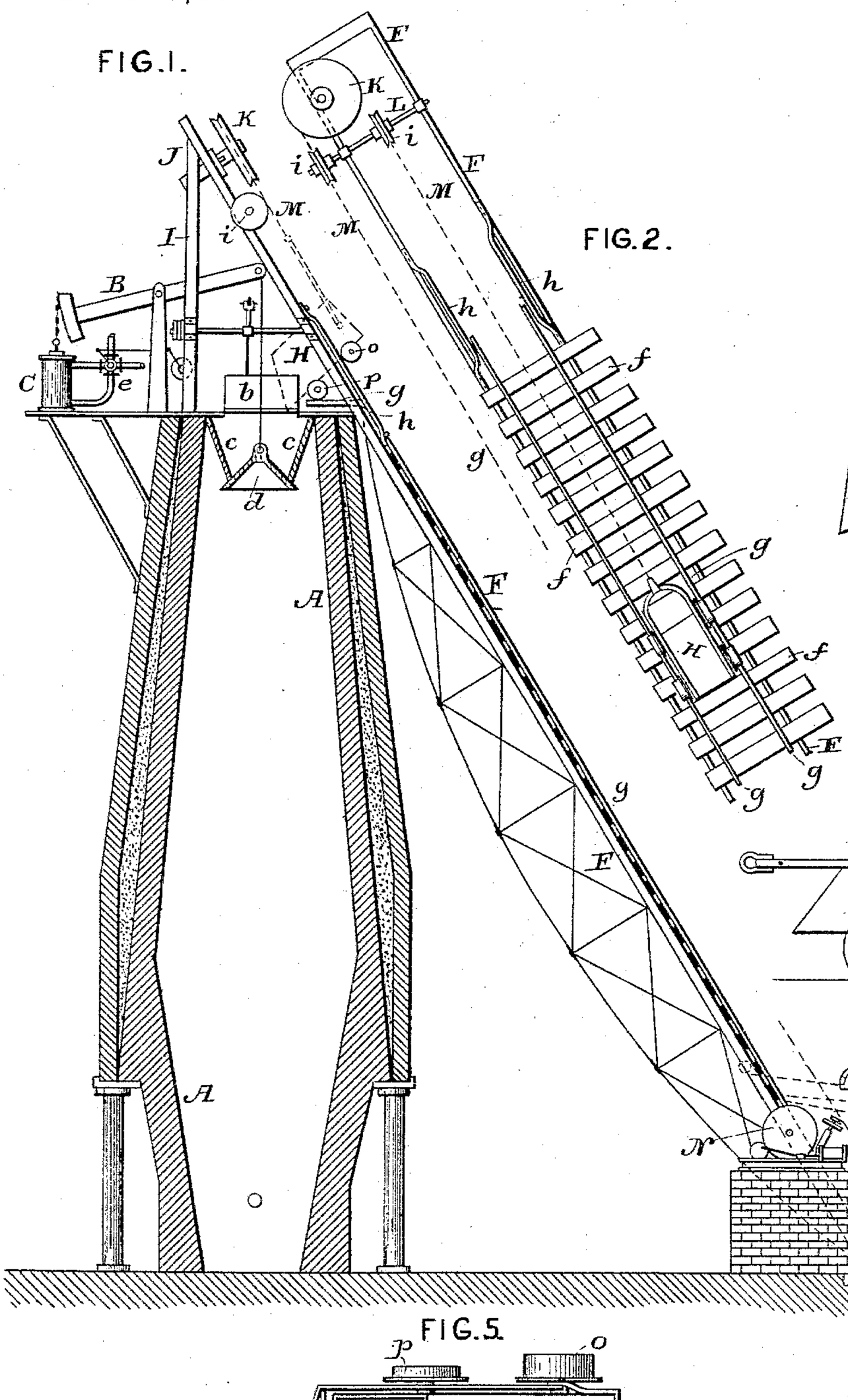


FIG. 2.

FIG. 3.

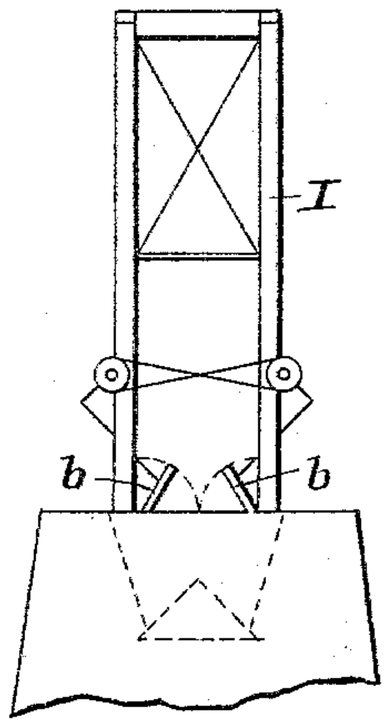


FIG. 4.

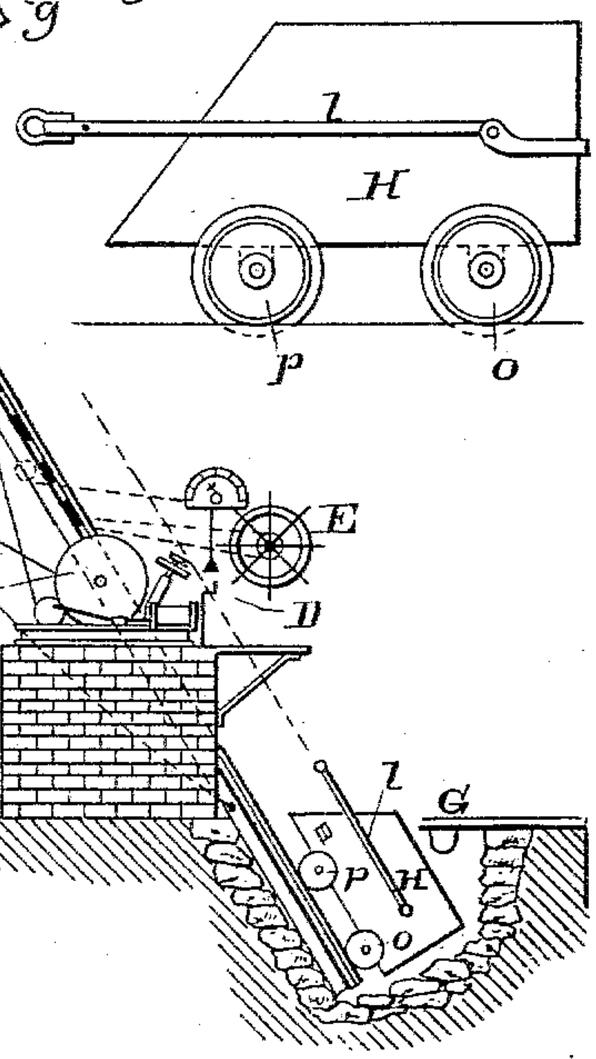
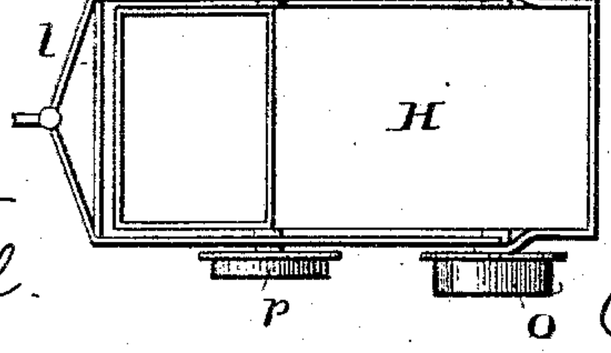


FIG. 5.



ATTEST.

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UNITED STATES PATENT OFFICE.

FAYETTE BROWN, OF CLEVELAND, OHIO.

BLAST-FURNACE.

SPECIFICATION forming part of Letters Patent No. 323,634, dated August 4, 1885.

Application filed January 13, 1885. (No model.)

To all whom it may concern:

Be it known that I, FAYETTE BROWN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Blast-Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this application.

My invention relates to certain new and useful improvements in hoisting and top-filling apparatus for blast-furnaces; and it consists in the employment, for the purpose of supplying the ores, fuel, &c., to the top opening of the furnace, of the novel means and appliances which will be hereinafter more fully described, and which will be more particularly pointed out and specified in the claims of this specification.

To enable those skilled in the art to which my invention relates to fully understand and practice the same, I will now proceed to more fully describe the several features thereof, referring by letters to the accompanying drawings, which make part of this specification, and in which I have illustrated so much of an ordinary blast-furnace and of my improved hoisting and top-filling contrivance as seems to be necessary for the purpose of showing the construction of my improvements.

In the drawings, Figure 1 is a vertical sectional view of a blast-furnace with my improved contrivance combined therewith. Fig. 2 is a partial plan or face view of the inclined hoistway or bridge which I use; Fig. 3, a detail back view or elevation of what I call the "supplemental" or "back" frame, which supports the upper end of the bridge, and other devices. Fig. 4 is a side view of one of the carriers detached. Fig. 5 is a top view of said detached carrier.

In the several figures the same part will be found designated by the same letter of reference.

In the drawings, A represents an ordinary blast-furnace provided at the top opening with the usual metallic cover and with sealing-doors *b b*, of approved pattern or construction, and also with the usual hopper, *c*, and bell *d*.

As will hereinafter be more fully explained, the sealing-doors *b* may be made comparatively small (which is desirable) by reason of the use of automatically-dumping carriers.

The bell *d* is opened and closed at the will of the engineer through the medium of lever B and compressed-air cylinder or engine G, and a cock in valve *e* connected by means of suitable cords or cables with a hand-crank, D, located where the engineer who attends to the hoisting-engine stands, while the gas-sealing doors *b b* are with equal convenience manipulated by the engineer by certain connections under his control and worked by turning in one direction or the other the hand-wheel E.

As all the devices or special appliances for the management of the bell and gas-sealing doors, together with some other parts of the apparatus herein shown, form the special subject-matter of other applications by me, (filed prior to this case,) I need not herein further describe such parts of the machine or contrivance.

F is an inclined bridge or roadway, composed, as shown, of a suitably-constructed iron truss-work provided during the greater portion of the roadway for the carriers with cross-ties *f*, on which is laid and secured a track composed of the two T-rails *g g*, as shown. These rails, which may form a track of about forty-four-inch gage, extend from the lower end of the bridge or road-bed up to a level about even with the top of the furnace, at which point they are bent over, so as to run for a short distance horizontally and immediately over the furnace-top, as clearly shown. (See Fig. 1.) A continuation of the inclined track is formed for some distance upwardly beyond where the rails *g g* are bent, as described, by two short supplemental rails, *h h*, which, however, are arranged farther apart, and so as to form a wider gage than that of the rails *g g*, for a purpose to be presently explained. The lower end of the inclined track and bridge extends down into a pit, G, in order that the carriers may be conveniently filled or charged with the ore, fuel, &c., to be elevated, and the upper end of said bridge is extended some distance beyond the top of the furnace, where it is secured to the top of a vertical frame, I, all as best seen at Figs. 1 and 3. Near the upper end of the bridge F is secured thereon the

short shaft J, that carries the cable-pulley K, and also the shaft L, that carries the idlers *i i*, which guide and support the cable M, one end of which is hitched to the bail *l* of the carrier H, and the other end of which is wound on the drum of the hoisting-engine at N. The body of the carrier H is made preferably of steel, of about the proportions and shape shown, its top or open end being oblique to its sides, so as to be about level when the carrier is in position in the inclined bridge, as seen in full lines at Fig. 1. The hind wheels, *o o*, have wider treads than the front wheels, *p p*, (see Fig. 5,) so that when the carrier is drawn up into the position shown in dotted lines at Fig. 1 the front wheels will pass down between the supplemental rails or track *h h* and follow along on or keep to the horizontal portions of the rails *g g*, while the back wheels, *o o*, will run on top of the short rails or track *h h*, thus causing the tipping over and dumping of the carrier for the purpose of discharging its contents into the opening at the top of the furnace when the gas-sealing doors are open.

In connection with the foregoing description, coupled with the drawings, the following explanation will suffice to make clear the operations of my improved contrivance. Supposing the bell *d* to be up, and the bottom of the hopper thus closed, and the gas-sealing doors *c c* to be opened or raised, and the carrier H, while down in the pit G, as shown in Fig. 1, to have been filled or charged. The engineer then starts the hoist-engine, thereby causing the cable M to draw the carrier upwardly over the inclined roadway. On approaching the upper terminus of its journey the carrier, by reason of its forward wheels, *p p*, keeping on and following the lines of the rails *g g*, while its broader back wheels, *o o*, ride on upwardly on the rails *h h*, tips over or assumes the position shown in the dotted lines at Fig. 1, whereby its entire contents is dumped or discharged into the top opening of the furnace and onto the apex of the bell, the hinged sealing-doors *b b* having been lifted to permit this operation. When the discharge shall have thus been effected, the engineer causes the carrier to retrace its movements to the pit G. Then by means of the hand-wheels E he closes down the sealing-doors *b b*, and by turning the hand-crank at D, so as to work the cock or valve at *e*, causes the air-engine *c* to lower the bell *d* and allow the contents of the hopper to fall into the body of the furnace. He then, by the same means and appliances, raises the bell to its uppermost portion, so as to close the bottom of the hopper, and raises or opens the gas-sealing doors, ready for the reception of another charge from the carrier. Upon the descent of the carrier to its original lowermost position it may be again filled and the described operations repeated.

It will be seen that by the use of my improved contrivance or apparatus not only is the carrier taken by machinery from the locality where it is charged directly to the top opening of the furnace, but it is, on arrival at the top opening, automatically dumped; but it will be understood that while I have devised the means or combinations of devices for effecting all the operations and objects arrived at in one contrivance an apparatus might be made containing less than all these features which would, nevertheless, possess great advantages over all previously known contrivances for top-filling. For instance, the means shown for elevating the carrier from where it is charged directly to the top opening of the furnace might be employed with great advantage without having combined with it any means for automatically dumping the carrier after its arrival at said opening.

I am aware that heretofore cars drawn by locomotives have been used to carry the loads to the tops of furnaces; and also that endless-band conveyers and screw-conveyers have been used for the same purpose; but I disclaim the employment of any such means as a part of my invention, the gist of which will be found fully set forth in the claims.

All subject-matter herein shown and described, but not claimed, is disclaimed in favor of an application filed by me on the 12th of November, 1883, (Serial No. 111,506.)

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

1. In combination with a furnace having a bell or cone at its top or mouth, and a suitable stationary hoisting motor or machine, a car or carriage, and ways for the same to travel on, the combination being such, as described, that the loaded car may be hoisted from the lower terminus of the track to the upper terminus thereof and its contents dumped into the top opening of the furnace and onto the apex of the cone or bell, as set forth.

2. In combination with a furnace having a bell or cone at its top or mouth, and a suitable hoisting motor or machine, an inclined track or roadway, and a car or carriage, whereby the loaded car may be hoisted from the lower terminus of the track to the upper terminus and its contents dumped into the top opening of the furnace and onto the apex of the bell, as set forth.

3. In combination with the furnace provided with a bell or cone, the roadway leading directly to the top opening of the furnace, and the hoisting-machine, a car or carriage which travels from the hoisting-machine to a point directly over the top opening of the furnace, and means whereby the car is automatically dumped on its arrival at said point, and so as to discharge its contents directly into said top opening, all substantially as shown and described.

In testimony whereof I have hereunto set my hand this 5th day of January, 1885.

FAYETTE BROWN.

In presence of—

CHAS. T. PRATT,

A. G. LANGELL.