

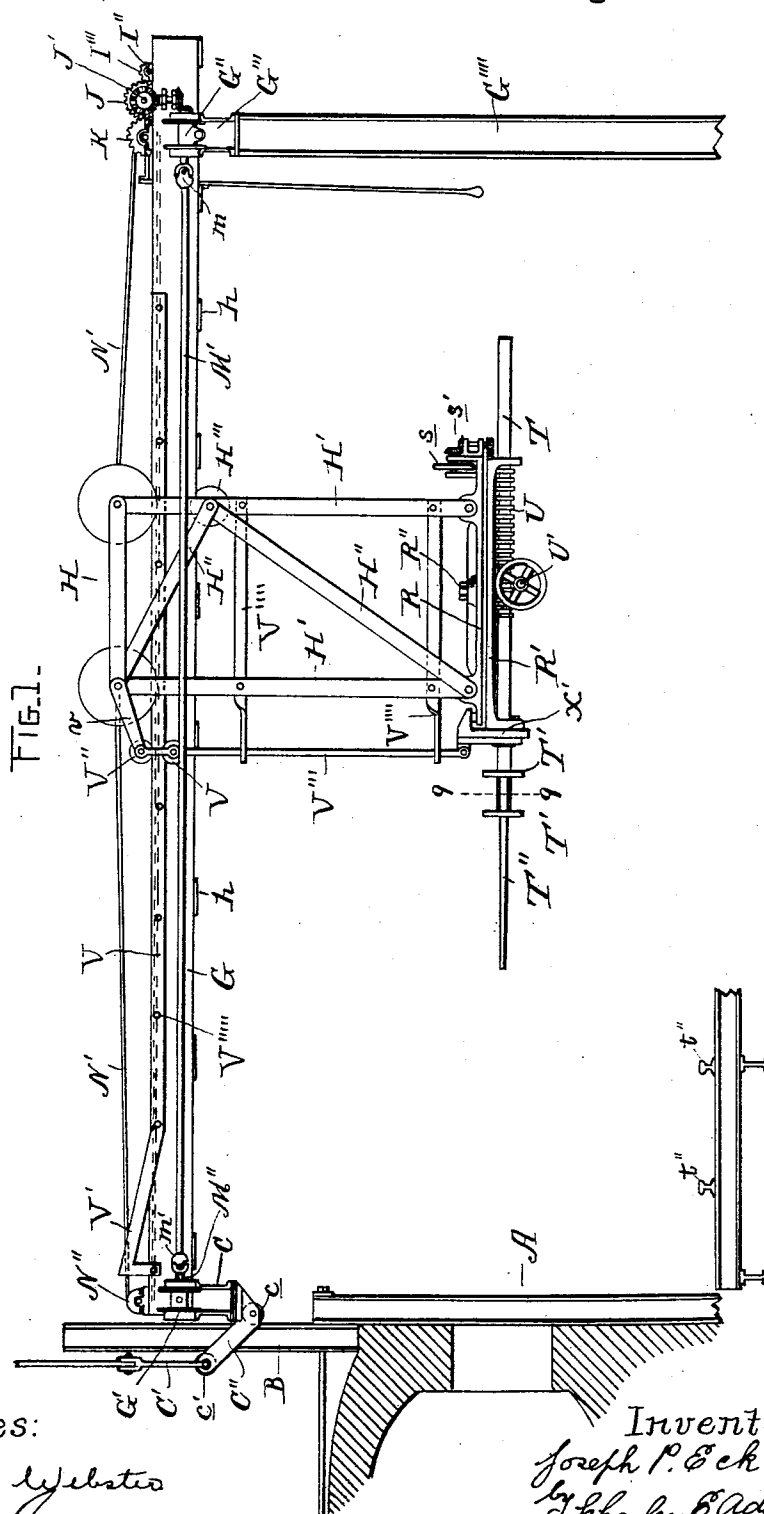
(No Model.)

5 Sheets—Sheet 1.

J. P. ECK.
FURNACE CHARGING MECHANISM.

No. 587,942.

Patented Aug. 10, 1897.



Witnesses:

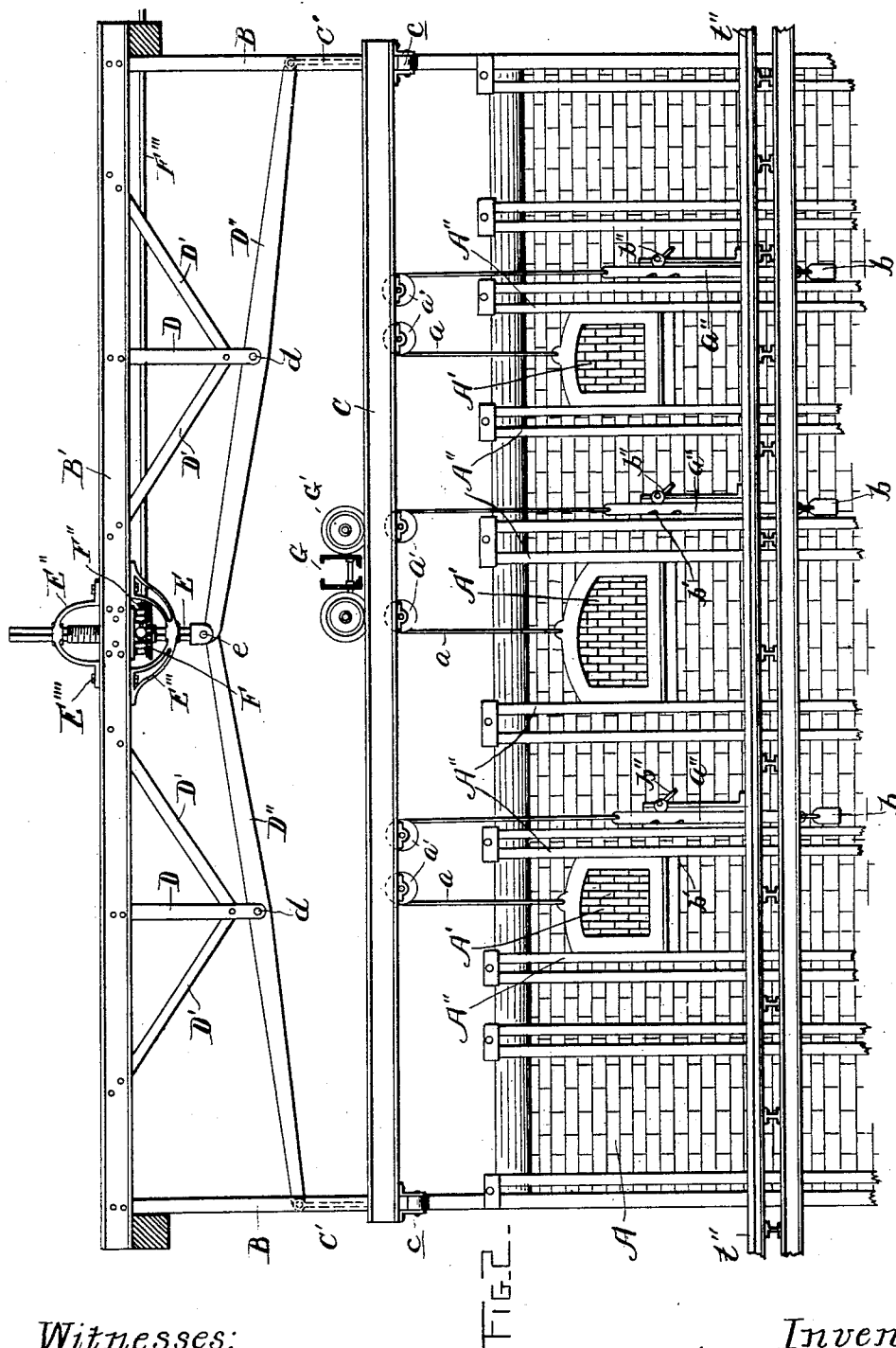
Carroll G. Webster
W. B. Adams

Inventor
Joseph P. Eck
by Charles E. Adams
Attorney

J. P. ECK.
FURNACE CHARGING MECHANISM.

No. 587,942.

Patented Aug. 10, 1897.



Witnesses:

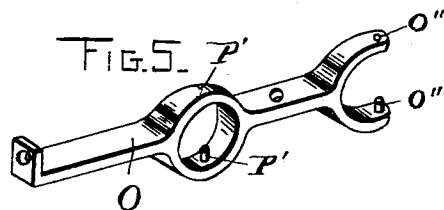
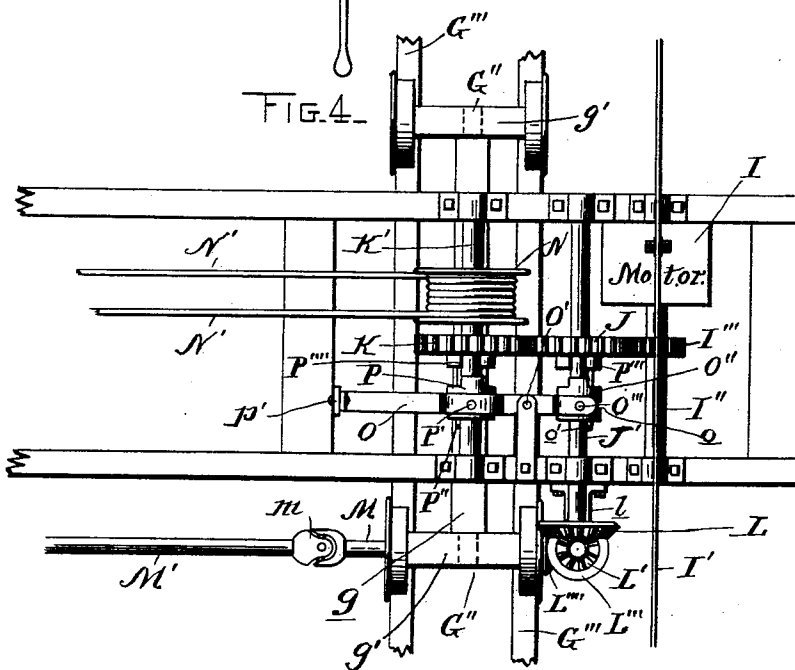
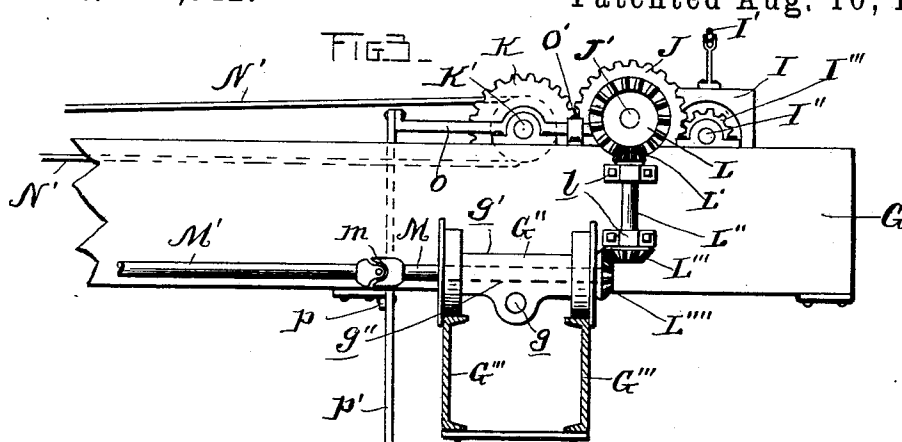
Carroll J. Webster
W. Bladen Jackson

Inventor
Joseph P. Eck
By Charles E. Adamson
Attorney

J. P. ECK.
FURNACE CHARGING MECHANISM.

No. 587,942.

Patented Aug. 10, 1897.



Witnesses:

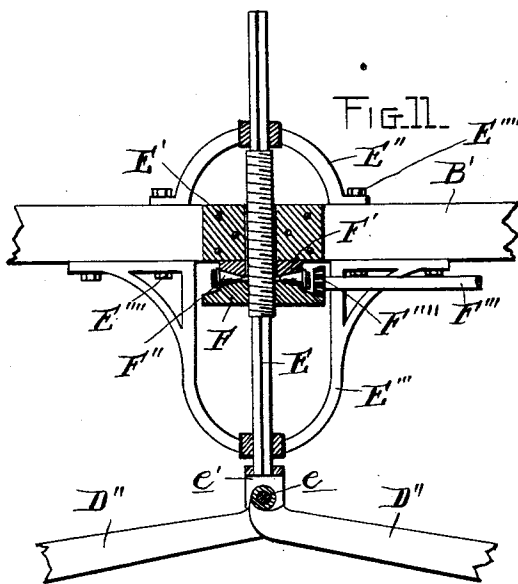
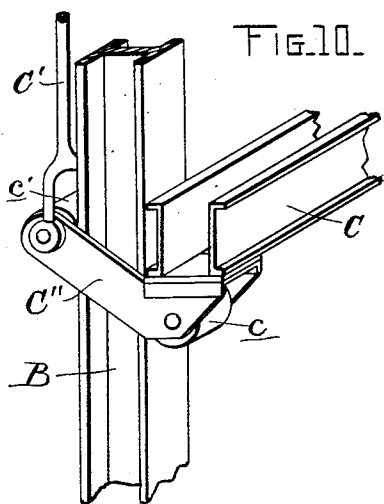
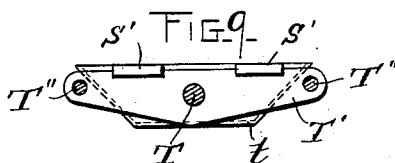
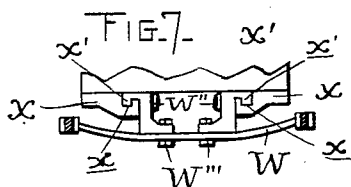
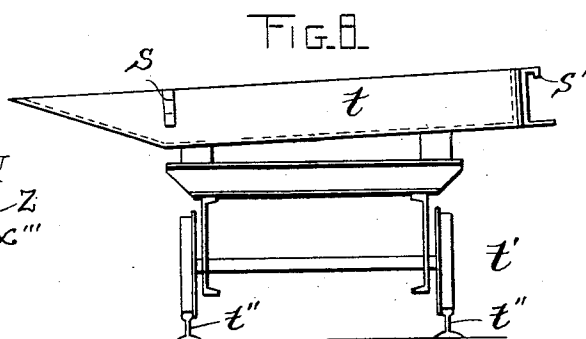
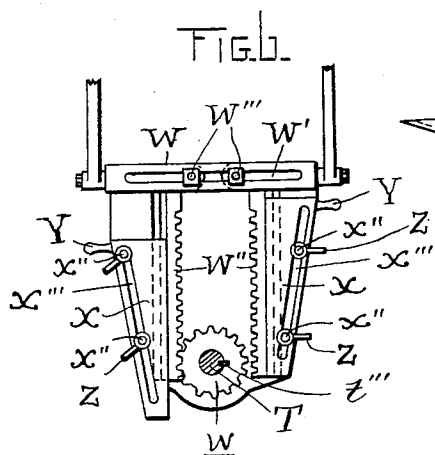
Carroll G. Webster
W. H. Jackson

Inventor
Joseph P. Eck
by Charles E. Adameon
Attorney

J. P. ECK.
FURNACE CHARGING MECHANISM.

No. 587,942.

Patented Aug. 10, 1897.



Witnesses:

Carroll J. Webster
W. Bladen Jackson

Inventor

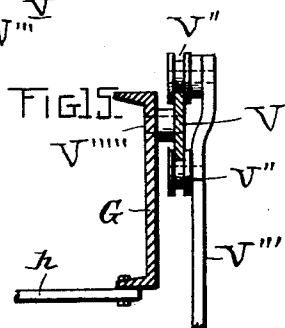
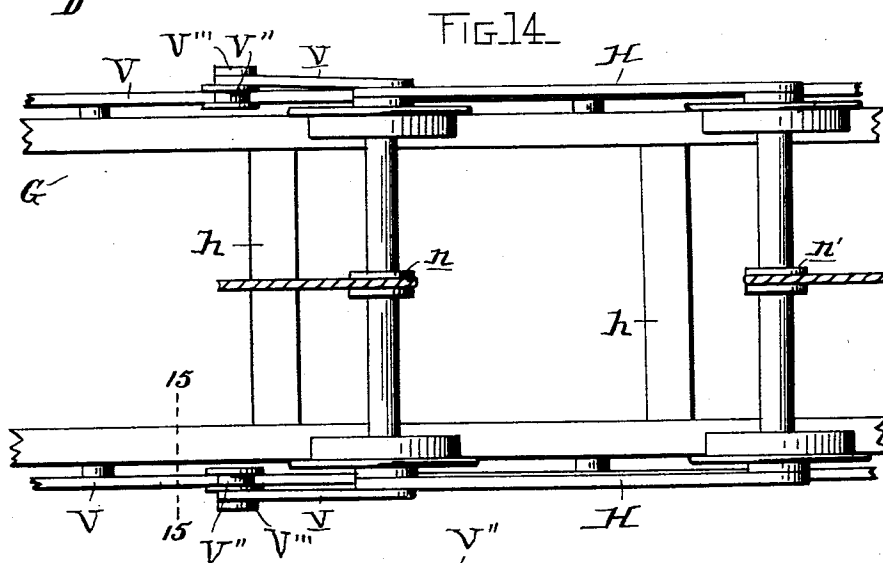
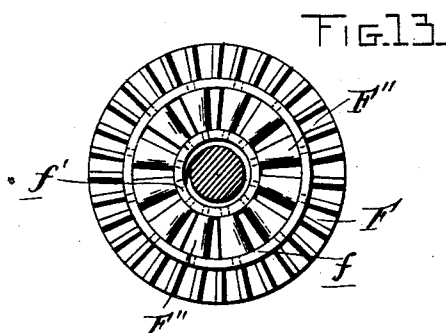
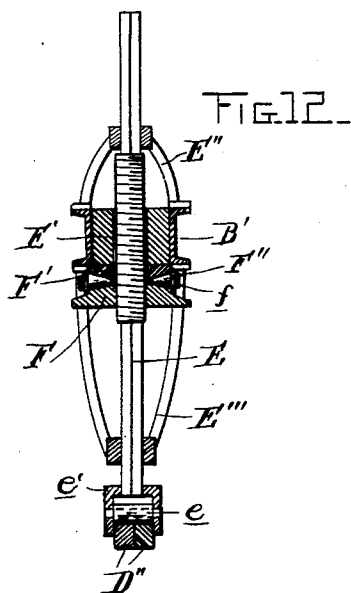
Joseph P. Eck
By Charles C. Adams
Attorney

J. P. ECK.

FURNACE CHARGING MECHANISM.

No. 587,942.

Patented Aug. 10, 1897.



Witnesses:
Carroll J. Webster
W. Bladen Jackson

Inventor
Joseph P. Eck
By Charles E. Adamson
Attorney

UNITED STATES PATENT OFFICE.

JOSEPH P. ECK, OF MUNCIE, INDIANA.

FURNACE-CHARGING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 587,942, dated August 10, 1897.

Application filed March 1, 1897. Serial No. 625,617. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH P. ECK, a citizen of the United States, residing at Muncie, in the county of Delaware and State of Indiana, have invented certain new and useful Improvements in Furnace-Charging Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a new and useful improvement in furnace-charging mechanism; and it consists in the construction and arrangement of parts hereinafter described, and definitely pointed out in the claims.

The aim and purpose of this invention is to construct a charging mechanism which will lift the charging-pan containing the charge from a track in front of the furnace and carry the charging-pan into the furnace and dump the pan and then return the pan to its position on the track at the front of the furnace.

It is also the purpose to hang the doors to the charging mechanism so that when the pan is lifted the door of the furnace selected will be opened and will be closed when the pan is returned to its initial position.

It is further the object to construct a mechanism which can be easily operated and which will contain the fewest possible parts capable of accomplishing the desired result.

These and other objects not hereinbefore mentioned are accomplished by the construction illustrated in the accompanying drawings, wherein like letters of reference indicate corresponding parts in the several views, and in which—

Figure 1 is a side elevation of a complete charging-machine, showing my invention with the exception of the track-elevating mechanism. Fig. 2 is a front elevation of a plurality of furnaces, illustrating the vertically-movable track upon which the charging mechanism proper is shifted to coincide with the several furnace-doors and the means for moving the track vertically. Fig. 3 is a side elevation of a portion of the laterally-moving frame or track, illustrating more particularly the means by which lateral movement is imparted to the frame and the means for moving the charging-pan carrier and operator longitudinally upon the frame or to

and from the furnace. Fig. 4 is a plan view of the mechanism illustrated in Fig. 3. Fig. 5 is a detail view of the clutch-lever. Fig. 6 is a front elevation of the means for dumping the pan. Fig. 7 is a plan view of the same. Fig. 8 is an elevation of the pan and the truck for carrying the same. Fig. 9 is a sectional view taken at a point indicated by the line 9 9, Fig. 1, illustrating the means for engagement with the pan of the charging-pan carrier. Fig. 10 is a detail view in perspective of one of the uprights of the furnace and the antifriction means employed in moving the vertically-movable track guided thereby in front of the furnaces. Fig. 11 is a front elevation, partly in section, of the means for moving the vertically-movable track. Fig. 12 is a transverse sectional view of the parts shown in Fig. 11. Fig. 13 is a plan view of the operating cog-wheel for raising and lowering the track and showing the antifriction-bearing interposed between the cog-wheel and the stationary support for the track. Fig. 14 is a plan view of a portion of the laterally-moving track or frame, illustrating the truck of the charging-pan carrier and operator which is supported therefrom; and Fig. 15 is a sectional elevation taken at a point indicated on the line 15 15, Fig. 14.

The subject-matter of this application is an improvement on the construction shown in the pending application of Joseph P. Eck, filed October 28, 1896, and bearing Serial No. 610,296.

In the drawings, A designates the front of a plurality of furnaces, and A' designates the doors. I have only shown three doors, although it is obvious that any number could be used. These doors are adapted to slide and are guided in the ways A'', secured to the front of the furnaces.

B designates the uprights. These uprights extend above the furnace and are independent of the furnace, so as to prevent any jar on the same, and support the cross-bar B' over the front portion of the furnace.

C designates the vertically-movable track. The opposite ends of this track are provided with the friction-rollers c, which bear against the uprights B. Depending from the cross-bar B' are the supports D, which are braced by the arms D', secured to the supports and cross-bar.

D'' designates levers which are pivoted intermediate their ends to the supports, as shown at *d*. Pivoted to the outer ends of these levers are the depending rods C'. The lower ends of these rods are pivoted to a link C'', which is connected to the vertically-movable track on the opposite side of the uprights B. *c*' is a friction-roller journaled in the links and bearing against the rear side of the uprights. It will thus be seen that the vertically-movable track will be guided by the uprights and will have a roller-bearing contact therewith.

The inner ends of the levers D'' are pivotally secured to the lower end of a square shaft E by means of a pin *e*, passing through the ends of the levers, and an enlargement *e*' on the lower end of the shaft. This shaft is round and screw-threaded for a portion of its length for a purpose hereinafter described and passes through an aperture in a block E', supported by the cross-bars B'. The shaft E is guided by the brackets E'' and E''', supported, respectively, upon the top and from the bottom of the cross-bars. These brackets are secured in place by the bolts E''', all as shown in Figs. 11 and 12.

F designates a beveled cog-wheel which is provided with a screw-threaded aperture engaging the screw-threads on the shaft. By the connection of the levers with the vertically-movable track and the lower end of the shaft, as before described, it will be seen that the weight of the track will normally tend to press the shaft upward and that this pressure will be exerted at all times. As the cog-wheel F is carried by the shaft, it is necessary to provide a bearing between the wheel and block E'. This is accomplished by securing to the bottom of the block E a bearing-plate F' and securing to the top portion of the cog-wheel a series of antifriction-rollers F''. These rollers are journaled upon and are secured in position by two concentric rings *f* and *f*', secured to the top of the wheel, all as shown in Fig. 13.

F''' designates a bevel gear-wheel meshing with the cogs on the wheel F. This wheel F''' is rigidly secured to a shaft F''', which is connected to any suitable motive power, preferably the electric motor for operating the other movable parts, hereinafter described. By this construction it will be seen that when the cog-wheel F is rotated by the shaft F''' and wheel F''' the shaft E will be raised or lowered, thereby raising or lowering the track C by means of the connecting-levers D'', rods C', and links C''. By forming the shaft E square it will not rotate in the brackets E'' and E'''.

The doors A' are supported by the track C and are adapted to be raised and lowered by the movement of the track. To each door is secured a cable *a*, which passes over pulleys *a*', journaled on the track. The ends of these cables extend downward and are secured to the notched bars *a*'', and to the bottom of the

bars is secured a weight *b*. The notches in the bar are adapted to be engaged with a projection *b*' on the front of the furnaces by means of the pivoted cam-lever *b*' on the front of the furnaces. When it desired to raise any one of the doors, the bar is locked in position and the door will be raised by the upward movement of the track. When the bar is not locked, the bar will rise with the track and the door remain stationary.

G designates the laterally-movable frame or track. This track is supported at its inner end upon the track C by means of the truck G', and at its outer end it is supported upon the truck G'', which is supported upon the stationary track G''', which is supported by the posts G'''. The frame is supported on the outer truck pivotally, so that the outer truck will always remain on its track when the inner truck and track are lowered. This is accomplished by supporting the frame upon a longitudinal bar *g*, which is rotatably secured in brackets *g*' on the axles *g*'' of the truck, as plainly shown in Figs. 3 and 4.

H designates the truck for supporting the charging-pan carrier and operator. This truck is longitudinally movable and is supported upon the frame G, as hereinafter described.

The frame G is moved laterally in front of the furnace on the tracks C and G''' and the truck H longitudinally on the frame G by the following mechanism.

I designates an ordinary reversible electric motor supported on the frame, which receives its source of supply from the line trolley-wire I'. This motor rotates a shaft I'', journaled on the frame.

I''' is a pinion rigidly secured on the parallel shaft I'', which meshes with a pinion J, which is loosely mounted on a parallel shaft J', which is journaled on the frame. The pinion J meshes with a pinion K, which is loosely mounted on the parallel shaft K', which is also journaled on the frame. To the outer end of the shaft J' is secured a beveled gear-wheel L, which meshes with a beveled gear-wheel L', which is rigidly secured to the vertical shaft L'', which is journaled in suitable bearings *l* on the side of the frame. On the lower end of the vertical shaft is a beveled gear-wheel L''', which meshes with a beveled gear-wheel L'''' on one of the axles of the truck G''. Extending from the opposite end of this axle is a short rod M, which is connected to the shaft M' by means of the universal joint *m*. The opposite end of this shaft M is connected by the universal joint *m*' with a rod M'', which extends from one of the axles of the truck G'. It will thus be seen that when the truck G'' is moved upon its track it will also move the truck by means of the shaft and connecting devices. By forming the shaft with universal joints it relieves the shaft of all strain and will enable the truck G'' to remain on the track G''' when the other truck is lowered. N designates a

drum rigidly secured upon the shaft K'. Around this drum is wrapped a cable N', which passes around the pulley N'' on the forward end of the track G, and has one end secured to the truck H at *n*, as shown in Fig. 14. The opposite end of the cable, after being wrapped around the drum, is secured to the truck H at *n'*, as also shown in said Fig. 14. By this construction it will be seen that the truck H will be moved longitudinally on the frame G whenever the drum is rotated and can be moved in either direction, according as the drum is rotated. It will further be noticed that when motion is imparted to the shafts J' and L' and the various meshing cog-wheels on these shafts both ends of the frame will be simultaneously moved on the tracks C and G''', all as plainly shown in Figs. 3 and 4.

O designates a clutch-lever, as shown in Fig. 5, for clutching the various parts to the motor-shaft. The clutch-lever is pivoted to the track G at O' and has its outer end pivoted to a clutch-sleeve O'' by means of pins O''', which engage the groove *o* on the periphery of the sleeve. This clutch-sleeve O'' is secured to the shaft J' by means of a spline *o'* and revolves with said shaft. The clutch-lever O is also pivoted to the clutch-sleeve P by means of the pins P' and encircles the said sleeve. This sleeve P is secured to and is adapted to rotate with the shaft K' by means of the spline P'' on the shaft. The clutch-sleeves are adapted to alternately engage the clutch-faces P''' and P'''' on the pinions J and K, respectively. The clutch-lever is operated by means of the lever *p'*, which is pivoted to the track G at *p* and which extends down a sufficient distance to be operated by the attendant. When it is desired to move the frame laterally, the clutch-sleeve O'' is brought into engagement with the clutch-face on the pinion J, thereby moving the shaft J', cog-wheel L, and its various connections, rotating the axle on the truck G'' and the axle on the truck G' through the shaft M, as before described. When it is desired to move the truck longitudinally on the frame, the clutch-sleeve P is brought into engagement with the clutch-face on the pinion K, thereby rotating the shaft K' and drum N and moving the truck H by means of the cable N', as before described. It will be seen that by reversing the motor the movement of the various parts can be reversed.

Depending from the truck H are the bars H'. These bars are braced by the cross-bars H''.

H''' is a wheel resting on the bottom of the track or frame G to make the truck run even on the said frame or track.

h are cross-braces for the track-frame. It will be seen by referring to Fig. 15 that these cross-braces do not extend entirely across the bottom of the tracks and will not, therefore, be in the way of the wheels H''.

Supported from the lower ends of the bars

H' is a platform R. To the lower portion of the platform is pivotally secured a plate R' by means of the bolt R''. Supported on the plate R' is the charging-pan shaft T. To the outer end of this shaft are secured two plates T', which are secured together by the shaft and the prongs T'''.

t designates the charging-pan, which normally rests upon a truck *t'* on the tracks *t''* at the front of the furnaces. This pan *t* is provided with the hooks S on its opposite sides and the hook S' at its front edge, as shown in Figs. 8 and 9. The prongs T''' on the shaft are prolonged to engage the hooks S on the side of the pan, and the hook S' on the pan will be engaged by the plate T'. By this construction the shaft T will firmly grasp the pan when it is desired to lift the pan into the furnaces. The plate R' is rotated upon the platform R by means of the hand-wheels *s* on the platform and gearing *s'*, as described in the pending application of Joseph P. Eck.

To provide for the independent movement of the shaft T, the said shaft is provided with the rack U, which meshes with a pinion on the hand-shaft U', as fully described in the said application of Joseph P. Eck.

To dump the charging-pan in the furnace and return it to its truck in proper position, I employ the following mechanism: Along the side of the track or frame G are placed tracks V, which are inclined at their inner ends, as shown at V' in Fig. 1. Engaging these tracks are the wheels V'', which are secured together by the depending bars or rods V''' and are pivoted to the truck H by the links *v*. These rods pass through bearings on the bars V'''. The tracks are secured to the track-frame by the pins V''''', all as shown in Figs. 14 and 15. The lower ends of the rods are secured together by the cross-piece W, which is provided with the slot W', as shown in Figs. 6 and 7. Depending from the cross-piece W are the racks W''. These racks are secured to the cross-piece by the bolts W''', which pass through the slot W' in the cross-piece. By this construction the racks can be slid on the cross-piece and either rack can be brought into engagement with the pinion *w*, which is secured on the shaft T by means of a spline *t'''*. It will also be seen that when the truck H is moved inward toward the furnace, carrying the charging-pan into the furnace, the wheels V'' will ride up the incline V' of the track V, thereby actuating the racks W'' and dumping the pan in either direction, according to which rack is engaging the pinion *w*. When the pan is withdrawn from the furnace, the movement is reversed and the pan will be returned to its truck in its proper position. The racks are moved into and out of engagement with the pinion *w* by means of the cams X, which are secured to a plate X' on the plate R' by means of the bolts X'', which pass through the inclined slots X''' on the cams. The cams are secured to the racks by means of the comple-

mentary projections and grooves x and x' on the cams and racks, respectively. When either cam is moved down or up, it will engage or disengage the rack to which it is connected with the pinion w on the shaft T.

Y is a handle for operating the cams.

Z are handle-nuts on the bolts X'' for locking the cams in their adjusted position.

I am aware that many minor changes can be made in the construction and arrangement of parts as illustrated and described without in the least departing from the nature and principles of my invention.

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

1. In a machine for charging furnaces, the combination with a frame located in front of the furnaces, of a track for supporting one end of the charging mechanism arranged to have a vertical movement on the frame; a screw-threaded shaft supported on the frame above the track, levers pivoted to the frame and having their opposite ends pivoted to the shaft and track, and means engaging the threaded shaft for raising and lowering the shaft upon the frame, substantially as described.

2. In a machine for charging furnaces, the combination with a frame located in front of the furnaces, of a track for supporting one end of the charging mechanism arranged to have a vertical movement on the frame, a screw-threaded shaft supported on the frame above the track, levers pivoted to the frame and having their opposite ends pivoted to the shaft and track, a wheel having a threaded aperture engaging the threaded shaft and bearing against the frame, and means for actuating the wheel, substantially as described.

3. In a machine for charging furnaces, the combination with a frame located in front of the furnaces, of a track for supporting one end of the charging mechanism arranged to have a vertical movement on the frame, a screw-threaded shaft supported on the frame above the track, levers pivoted to the frame and having their opposite ends pivoted to the shaft and track, a gear-wheel having a threaded aperture engaging the threaded shaft and bearing against the frame, and gearing connected with suitable power for operating the gear-wheel on the shaft, substantially as described.

4. In a machine for charging furnaces, the combination with a frame located in front of the furnaces, of a track for supporting one end of the charging mechanism arranged to have a vertical movement on the frame, a screw-threaded shaft supported on the frame above the track, levers pivoted to the frame and having their opposite ends pivoted to the shaft and track, a wheel having a threaded aperture engaging the threaded shaft and bearing against the frame, means for actuating the wheel and antifriction-bearing between

the wheel and frame, substantially as described.

5. In a machine for charging furnaces, the combination with a frame located in front of the furnaces, of a track for supporting one end of the charging mechanism arranged to have a vertical movement on the frame, a screw-threaded shaft supported on the frame above the track, levers pivoted to the frame and having their opposite ends pivoted to the shaft and track, a wheel having a threaded aperture engaging the threaded shaft, means for actuating the wheel, and rollers on the upper face of the wheel bearing against the frame, substantially as described.

6. In a machine for charging furnaces, the combination with a frame located in front of the furnaces and a track for supporting one end of the charging mechanism adapted to have a vertical movement on the frame, of a screw-threaded shaft on the frame for supporting the track, a wheel having a threaded aperture engaging the threaded shaft, rollers on the upper face of the wheel bearing against the frame, and concentric rings on the upper face of the wheel in which the rollers are journaled, substantially as described.

7. In a machine for charging furnaces, the combination with a frame located in front of the furnaces, and a track for supporting one end of the charging mechanism adapted to have a vertical movement on the frame, of a screw-threaded shaft on the frame for supporting the track and normally forced upward by the weight of the track, a wheel having a threaded aperture engaging the threaded shaft and located below the frame, cog-teeth on the upper face of the wheel and rollers within the cog-teeth bearing against the frame, substantially as described.

8. In a machine for charging furnaces, the combination with the furnace-doors, of a track arranged over the front of the furnace for supporting one end of the charging mechanism, a frame located in front of the furnaces for supporting the track, a screw-threaded shaft supported on the frame above the track, levers pivoted to the frame and having their opposite ends pivoted to the shaft and track, means engaging the threaded shaft for raising and lowering the shaft upon the frame, and means connecting the doors and track whereby the doors will remain closed or will be opened by the movement of the track, substantially as described.

9. In a machine for charging furnaces, the combination with a frame located in front of the furnaces of a track for supporting one end of the charging mechanism arranged to have a vertical movement on the frame and supported by the frame, means for vertically moving the track, links connecting said means with the opposite ends of the track, and antifriction-bearings on the links bearing against the vertical uprights of the frame, substantially as described.

10. In a machine for charging furnaces, the combination with a frame located in front of the furnaces, of a track for supporting one end of a charging mechanism arranged to have a vertical movement on the frame, a movable shaft supported on the frame above the track, levers pivoted to the frame having one of their ends pivoted to the shaft a depending rod pivoted to the opposite ends of the levers, and a link embracing the up-rights of the frame for connecting the lower ends of the rods with the ends of the track, substantially as described.

11. In a machine for charging furnaces, the combination with a vertically-movable track arranged over the front of the furnaces, of a stationary track arranged in front of the vertically-movable track, a movable frame or track supported on trucks on the tracks, a motor carried by the frame, and gearing connecting the motor and axles of the trucks for laterally moving the frame across the front of the furnaces, substantially as described.

12. In a machine for charging furnaces, the combination with a vertically-movable track arranged over the front of the furnace, of a stationary track arranged in front of the vertically-movable track, a movable frame or track supported on trucks on the tracks, a motor carried by the frame, gearing connecting the motor with the axle of one of the trucks and a shaft connecting said axle with the axle of the other supporting-truck, substantially as described.

13. In a machine for charging furnaces, the combination with a vertically-movable track arranged over the front of the furnace, of a stationary track arranged in front of the vertically-movable track, a movable frame or track having one end supported on a truck on the vertically-movable track and the opposite end pivotally supported on a truck on the stationary track, a motor carried by the frame, gearing connecting the motor with the axle of one of the trucks and a flexibly-jointed shaft connecting said axle with the axle of the other supporting-truck, substantially as described.

14. In a machine for charging furnaces, the combination with a vertically-movable track arranged over the front of the furnace, of a stationary track arranged in front of the vertically-movable track, a movable frame or track supported on trucks on the tracks, a motor carried by the frame, a shaft actuated by the motor, a pinion on the shaft, a parallel shaft on the frame, a pinion loosely mounted thereon meshing with the pinion on the motor-shaft, a gear-wheel on the end of said shaft, a shaft on the side of the frame, having gear-wheels at its opposite ends the upper gear-wheel meshing with the gear-wheel on the parallel shaft, a gear-wheel on the end of the axle of one of the supporting-trucks meshing with the lower gear-wheel on the shaft on the side of the frame, a connection between the axles of the supporting-trucks and a

clutch member slidingly secured on the parallel shaft for actuating said shaft when the clutch member is brought into engagement with the loose pinion thereon, substantially as described.

15. In a machine for charging furnaces, the combination with a vertically-movable track arranged over the front of the furnace, of a stationary track arranged in front of the vertically-movable track, a movable frame or track supported on trucks on the tracks, a longitudinally-movable truck supported on the frame, a motor-shaft on the frame, a pinion on the motor-shaft, parallel shafts on the frame, pinions loosely mounted on the shafts and meshing with each other, one of the pinions meshing with the pinion on the motor-shaft, gearing connecting one of the parallel shafts with the axles of the trucks, a drum on the other parallel shaft, a cable wrapped around the drum having its opposite ends secured to opposite ends of the longitudinally-movable truck, clutch-sleeves slidingly secured on both of the parallel shafts, and a clutch-lever for engaging either clutch-sleeve with its pinion for actuating either shaft, substantially as described.

16. In a machine for charging furnaces, the combination with a vertically-movable track arranged over the front of the furnace, of a stationary track arranged in front of the vertically-movable track, a movable frame or track supported on trucks on the tracks, a longitudinally-movable truck supported on the frame, a motor-shaft on the frame, a pinion on the motor-shaft, parallel shafts on the frame, pinions loosely mounted on the shafts meshing with each other, one of the pinions meshing with the pinion on the motor-shaft, gearing connecting one of the parallel shafts with the trucks for actuating the same, gearing connecting the other parallel shaft with the longitudinally-movable truck for actuating the same, clutch-sleeves slidingly secured on both of the parallel shafts and a clutch-lever for alternately engaging either clutch-sleeve with its pinion for actuating either shaft, substantially as described.

17. In a charging device for furnaces, the combination with tracks arranged in front of the furnaces, of a frame or track supported on the tracks, a movable truck on the frame, a shaft carried by the truck adapted to carry a charging-pan, a pinion on the shaft, oppositely-arranged racks adapted to engage the pinion, means for actuating the racks upon the movement of the truck, sliding cams engaging the racks for bringing either rack into mesh with the pinion on the shaft and means for locking the cams in their adjusted position, substantially as described.

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

JOSEPH P. ECK.

Witnesses:

WM. L. LYONS,
JAMES GRUNDY, Jr.