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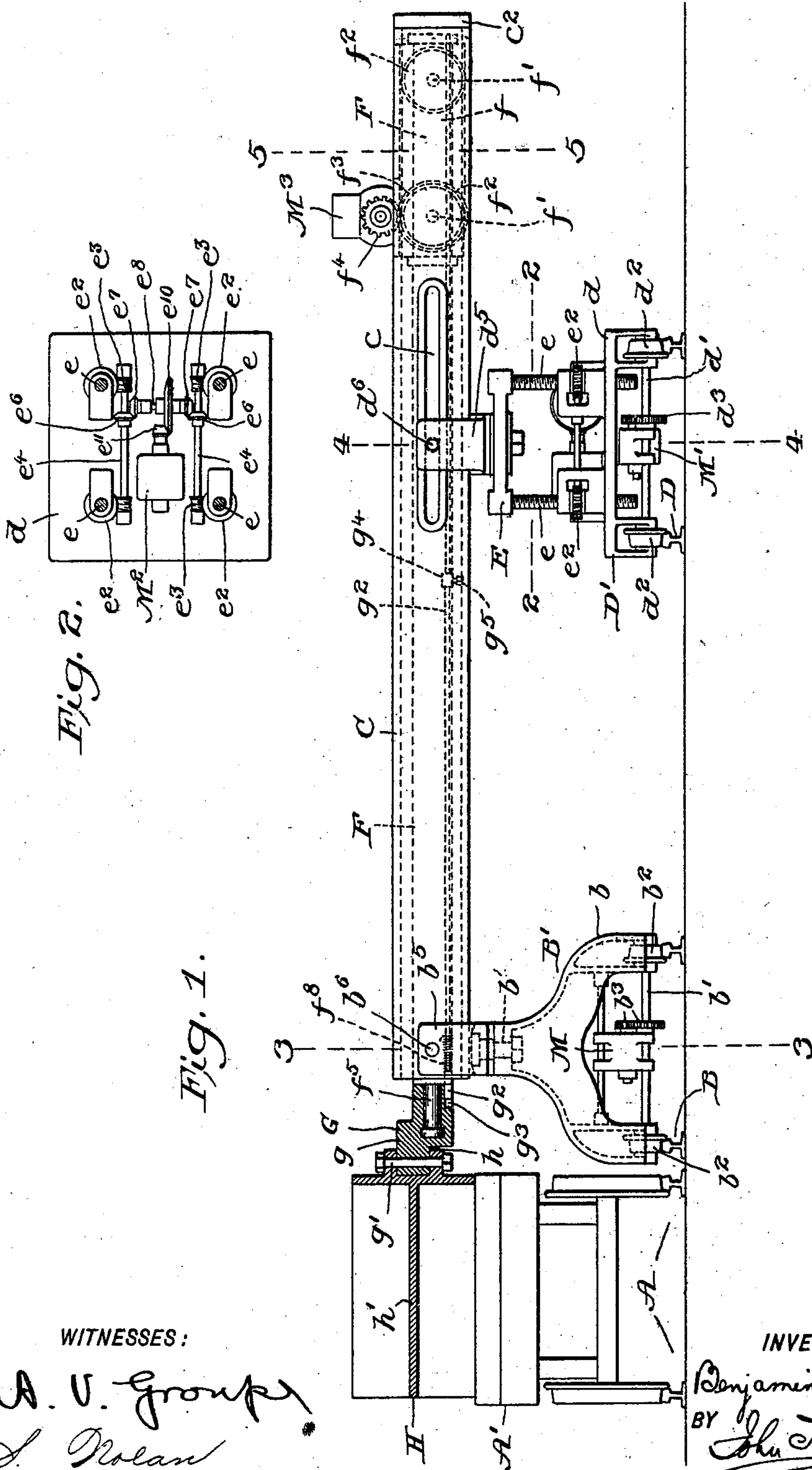
Patented Mar. 18, 1902.

B. A. FRANKLIN.  
FURNACE CHARGING APPARATUS.

(Application filed July 20, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

A. V. Group  
S. Nolan

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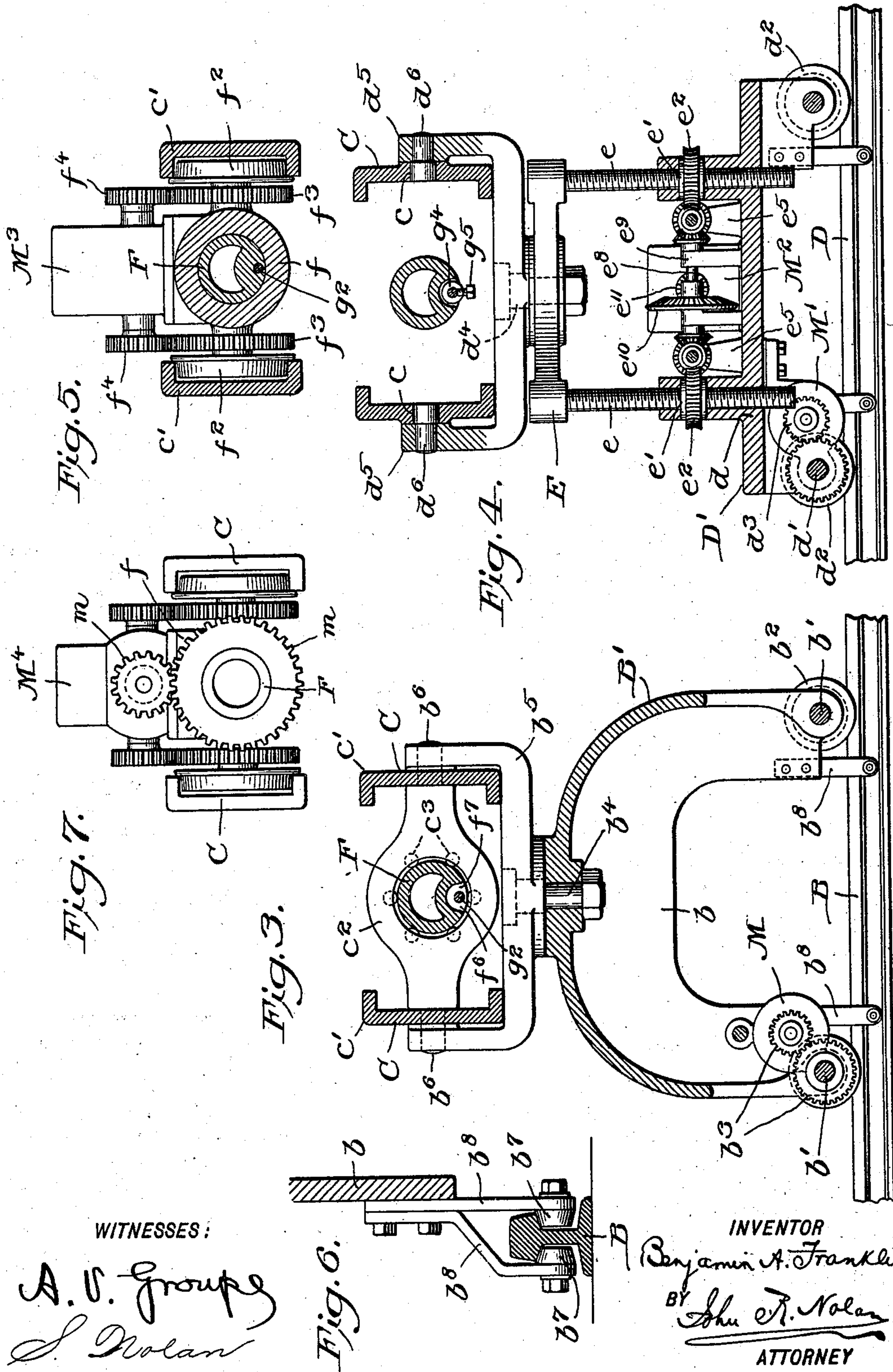
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Fig. 6.

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# UNITED STATES PATENT OFFICE.

BENJAMIN ALVEY FRANKLIN, OF PHILADELPHIA, PENNSYLVANIA.

## FURNACE-CHARGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 695,604, dated March 18, 1902.

Application filed July 20, 1901. Serial No. 69,029. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN ALVEY FRANKLIN, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Furnace-Charging Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to that class of furnace-charging apparatus in which is employed a charging-bar or "peel" movable into and out of the furnace in such a manner as to introduce a loaded charging-box to the furnace, deposit the contents of said box within the furnace, and then withdraw the empty box.

The primary object of my invention is to provide such an apparatus in which the charging-bar or peel and its supporting and operating mechanisms shall be so constructed and organized as to effect the traverse of said peel into and from the furnace at varying horizontal angles to permit the discharge of material into different parts of the furnace-chamber, as desired.

A further object of my invention is to provide for the tilting of the peel in a vertical plane to enable the same to raise the charging-box preparatory to carrying it into the furnace.

A further object of my invention is to provide a simple and efficient connection between the charging-box and the peel, whereby the box when it has been introduced into the furnace-chamber may be automatically turned about the peel to dump the contents of the box into said chamber.

With these objects in view my invention consists in novel features of construction and combinations of parts, which will be hereinafter particularly described and claimed.

In the drawings, Figure 1 is a side elevation, partly in section, of a furnace-charging apparatus embodying my invention. Fig. 2 is a horizontal section as on the line 2 2 of Fig. 1. Fig. 3 is a transverse section, enlarged, as on the line 3 3 of Fig. 1. Fig. 4 is a similar section as on the line 4 4 of Fig. 1. Fig. 5 is a similar section as on the line 5 5 of Fig. 1. Fig. 6 is a detail of a portion of one

of the trucks for the peel-frame, showing depending rail-engaging rollers on the truck. Fig. 7 is an end view of the peel-carriage and adjuncts, showing means for rotating the peel about its axis.

A represents a trackway extending adjacent to and parallel with the front of the furnace; A', the usual wheeled truck, constructed and arranged to traverse said trackway and to transport the loaded charging-boxes to the door or doors of the furnace and thereafter to remove the empty boxes. Adjacent to this trackway and parallel therewith is a trackway B, upon which is mounted a wheeled carriage B', constructed to support the forward end of the peel-frame C. A suitable distance from this trackway and parallel therewith is another trackway D, upon which is mounted a wheeled carriage D', constructed to support the rearward end of the frame. The connections between the frame and the respective carriages are such that when both carriages are moved together in the same direction the peel-frame will be impelled thereby along the front of the furnace and at right angles thereto and that when the outer carriage D' is moved independently of the forward carriage B' the peel-frame will be swung horizontally about its axial support on the latter carriage in a manner to incline said frame horizontally in respect to the front of the furnace.

Provision is had whereby the rearward end of the peel-frame may be raised or lowered on the carriage D', so as to impart a rising or falling movement to the forward end of said frame, as desired.

The forward carriage B' comprises a suitable body b, provided with appropriate boxes or bearings for axles b', carrying flanged wheels b<sup>2</sup>, adapted to run on the rails of the trackway B. Upon the carriage-body is supported an electric motor M, the shaft of which is geared with one of the axles through coacting gear-wheels b<sup>3</sup>, whereby when the motor is operated the carriage will be impelled along the trackway in either direction desired. Upon the body b is centrally pivoted, by a vertical pivot-pin b<sup>4</sup>, a U-shaped frame b<sup>5</sup>, in and between the vertical members of which is horizontally pivoted, by trunnions b<sup>6</sup>, the forward end of the peel-frame, whereby the lat-



ter has capacity for oscillation in both horizontal and vertical planes. The carriage is preferably provided with suitably-located guiding and steadying rollers  $b^7$ , that take  
5 against the sides of the rails of the trackway B. These rollers are carried by depending arms  $b^8$  on the carriage-body.

The carriage D' comprises a body  $d$ , also provided with appropriate boxes or bearings  
10 for axles  $d'$ , carrying flanged wheels  $d^2$ , adapted to the rails of the trackway D. This body also supports an electric motor  $M'$ , which is operatively geared to one of the axles by the coacting gear-wheels  $d^3$  to effect the propul-  
15 sion of the carriage along its trackway. On this body is supported a vertically-adjustable bed E, upon which is centrally pivoted, by a vertical pivot-pin  $d^4$ , a U-shaped frame  $d^5$ , similarly to the corresponding frame, above  
20 described, in respect to the carriage B. On the inner sides of the vertical members of this frame  $d^5$  are trunnions  $d^6$ , which register with horizontal slots  $c$  in the peel-frame, whereby the latter may be raised or lowered  
25 correspondingly with the bed E and also be swung horizontally upon its vertical pivots  $b^4 d^4$  during the movement of the carriage D' upon the trackway.

In the present instance the bed E is sup-  
30 ported by four screw-rods  $e$ , depending from the respective corners of the bed and being guided in vertical guide-posts on the carriage-body  $d$ . On these rods are nuts  $e'$ , which comprise the hubs of worm-wheels  $e^2$ . These  
35 wheels are supported in horizontal openings in the guide-posts, to the end that when said wheels are properly rotated the screw-rods are raised or lowered, as desired. Coacting with the worm-wheels are worms  $e^3$  on the  
40 respective ends of two parallel shafts  $e^4$ , having their bearings in uprights  $e^5$  on the carriage-body. These shafts are provided with bevel-wheels  $e^6$ , with which coact correspond-  
45 ing wheels  $e^7$  on a transverse shaft  $e^8$ , having its bearings in uprights  $e^9$  on the carriage-body. Shaft  $e^8$  is equipped with a bevel-wheel  $e^{10}$ , with which coacts a pinion  $e^{11}$  on the shaft of an electric motor  $M^2$ , supported  
50 on the carriage-body. By this construction it will be seen that when the motor  $M^2$  is operated the worm-shafts  $e^4$  will be simultaneously rotated, thereby revolving the worm-wheels  $e^2$  and effecting thereby the elevation or depression of the screw-rods  $e$  and the bed  
55 E, as the direction of motion of the motor-shaft may determine. The carriage D' is preferably provided with depending guiding and steadying wheels similarly to the carriage B', above described.

60 The peel-frame C in its preferred construction comprises two parallel channel-beams  $c'$ , connected at or near their respective ends and maintained a suitable distance apart by cross-bars  $c^2$ . The forward bar is centrally perforated to afford a bearing (in which antifric-  
65 tion-rollers  $c^3$  may be employed) for the corresponding end of the peel or charging bar

F, the rearward end of the latter being supported and carried by a wheeled carrier  $f$ ,  
70 mounted between the lateral beams of the frame. This carrier comprises a cylindrical body for the reception of the end of the peel, provided with lateral stud-shafts  $f'$ , carrying  
75 flanged wheels  $f^2$ , which register with the channels of the bars, whereby the carrier may be run along said bars, so as to advance or retract the peel. On two of the diametrically  
80 opposite stud-shafts are spur-wheels  $f^3$ , with which coact pinions  $f^4$  on the shaft of an electric motor  $M^3$ , mounted on the body of the carrier, whereby when the motor is operated  
85 said carrier, together with the peel, will be impelled along the frame. The forward end of the peel is provided with a pintle  $f^5$ , which projects beyond the forward end of the frame  
90 C. On this pintle is supported a bracket G, having a raised or eccentric forward portion  $g$ , to which are adapted to be secured, by a vertical pin or bolt  $g'$ , laterally-projecting lugs  
95  $h$  on the charging-box H, the latter being so constructed that when the charging-bar, with the connected loaded box, is moved into the furnace the box will automatically turn about  
100 the axis of the pintle, and thus discharge the contents of the box into the furnace. Means are provided to prevent the premature turn-  
105 ing of the box, which means in the present instance comprises a longitudinally-movable latch-rod  $g^2$ , contained in a groove  $f^6$  in the under side of the peel and supported on per-  
110 forated webs  $f^7$  on the latter. The forward end of this rod is normally projected by the action, preferably, of a spring  $f^8$  into a recess or socket  $g^3$  in the under side of the pivot-  
115 bracket, so as to lock the latter temporarily in place; yet when the latch-rod is disengaged from the bracket against the pressure of the spring the bracket is free to rotate. On  
120 the latch-rod is a sliding collar  $g^4$ , carrying a depending set-screw  $g^5$ , by the manipulation of which the collar and screw may be adjusted lengthwise of the rod and secured in any de-  
125 sired position of adjustment. The head of this screw extends into the horizontal plane of the forward cross-bar  $c^2$  of the peel-frame, to the end that when the peel is advanced  
130 sufficiently such head will abut against the opposing cross-bar, and thereby effect the retraction of the latch, and perforce the release of the bracket. The screw is so adjusted  
lengthwise of the rod as to effect the release of the bracket when the loaded charging-box has been projected into the furnace.

The charging-box H comprises an open rectangular structure, the bottom  $h'$  of which is  
125 arranged midway between the upper and lower edges of its lateral and end walls, so as to lie above the axis of the pintle. The upper compartment is adapted to contain the  
130 load. Hence when the loaded box is projected into the furnace and the bracket released, as above stated, the box, being "top-heavy," so to say, turns by gravity about the axis of the pintle, and thereby discharges the



load into the furnace. This being done, the peel is retracted to withdraw the empty box from the furnace, which box is then deposited upon the truck, disengaged from the bracket, and carried off. The bracket is then set in proper position and another loaded box connected therewith preparatory to a repetition of the above-described operation.

It will be seen that irrespective of the side of the box resting upon the truck a compartment is provided for the reception of the charge. It will also be seen that by simultaneously operating the carriages B' D' the peel may be run to any desired station along the front of the furnace; that by operating the bed E on the carriage D' the forward portion of the peel will be tilted on its trunnions, so as to set the bracket G in proper position to be connected with the loaded charging-box; that by again operating said bed the forward portion of the peel, with the loaded box, may be raised into line with the inlet to the furnace, and that thereupon by operating the motor M<sup>3</sup> the peel-carrier may be moved toward the furnace, so as to correspondingly advance the peel and move the loaded box into the furnace. It will also be seen that by moving the carriage D' independently of the forward carriage B' when the loaded box has been introduced to the furnace the peel will be swung laterally in a horizontal plane, so as to move the box to either side of the furnace-chamber preparatory to discharging the contents of the box.

Instead of using the automatic dumping mechanism above described the bracket G may be fixedly secured to the end of the peel and means be provided for partially rotating the latter when the bracket and the connected loaded box have been moved into the furnace. Such means, as illustrated in Fig. 7, may comprise an independent electric motor M<sup>4</sup>, mounted on the body of the peel-carrier and connected by coacting-gears *m* with the end of the peel, the latter in that case being rotatably instead of rigidly supported in the carrier *f*.

I claim—

1. In a furnace-charger, the combination of a frame, a charging-bar movable longitudinally thereof, and two independent carriages upon which the respective ends of said frame are pivotally supported, substantially as described.

2. In a furnace-charger, the combination with two independent carriages, of a frame having at one end a horizontal and a vertical pivotal connection with one of said carriages, and having at the other end a similar connection with the other carriage, and a charging-bar longitudinally movable in said frame, substantially as described.

3. In a furnace-charger, the combination of a carriage mounted on rails in front of the furnace, a vertically-movable bed on said carriage, means for adjusting said bed, a second carriage mounted on rails between the rails first named and the furnace, a frame having pivotal connections with said second carriage and bed, and a charging-bar longitudinally movable in said frame, substantially as described.

4. In a furnace-charger, the combination of a carriage mounted on rails in front of the furnace, a vertically-movable bed on said carriage, means for adjusting said bed, a support having a vertical pivot connection with said bed, a second carriage mounted on rails located between the rails first named and the furnace, a support having a vertical pivot connection with said latter carriage, a frame having at one end thereof a horizontal sliding pivot connection with the support on said bed, and having at the opposite end a horizontal pivot connection with the support on the second carriage, and a charging-bar longitudinally movable in said frame, substantially as described.

5. In a furnace-charging apparatus, a frame including channel-bars and a transverse connecting-piece therefor provided with a bearing, a longitudinally-movable charging-bar supported in said bearing, and a carriage adapted to support the rearward end of said bar and provided with wheels which are mounted in the channels of the channel-bars, substantially as described.

6. In a furnace-charger, the combination with the charging-bar, of a bracket pivotally supported on the forward end of said bar and provided with an eccentric portion to support a charging-box, substantially as described.

7. In a furnace-charger, the combination with the charging-bar, of a bracket pivotally supported on the forward end of said bar and provided with an eccentric portion to support a charging-box, and a latch device for said bracket, substantially as described.

8. In a furnace-charger, the combination with the charging-bar, of a bracket pivotally supported on the forward end of said bar and provided with an eccentric portion to support a charging-box, a latch device for said bracket, and means for automatically operating said device to release the bracket, substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

BENJAMIN ALVEY FRANKLIN.

Witnesses:

ANDREW V. GROUPE,  
JOHN R. NOLAN.