

No. 644,053.

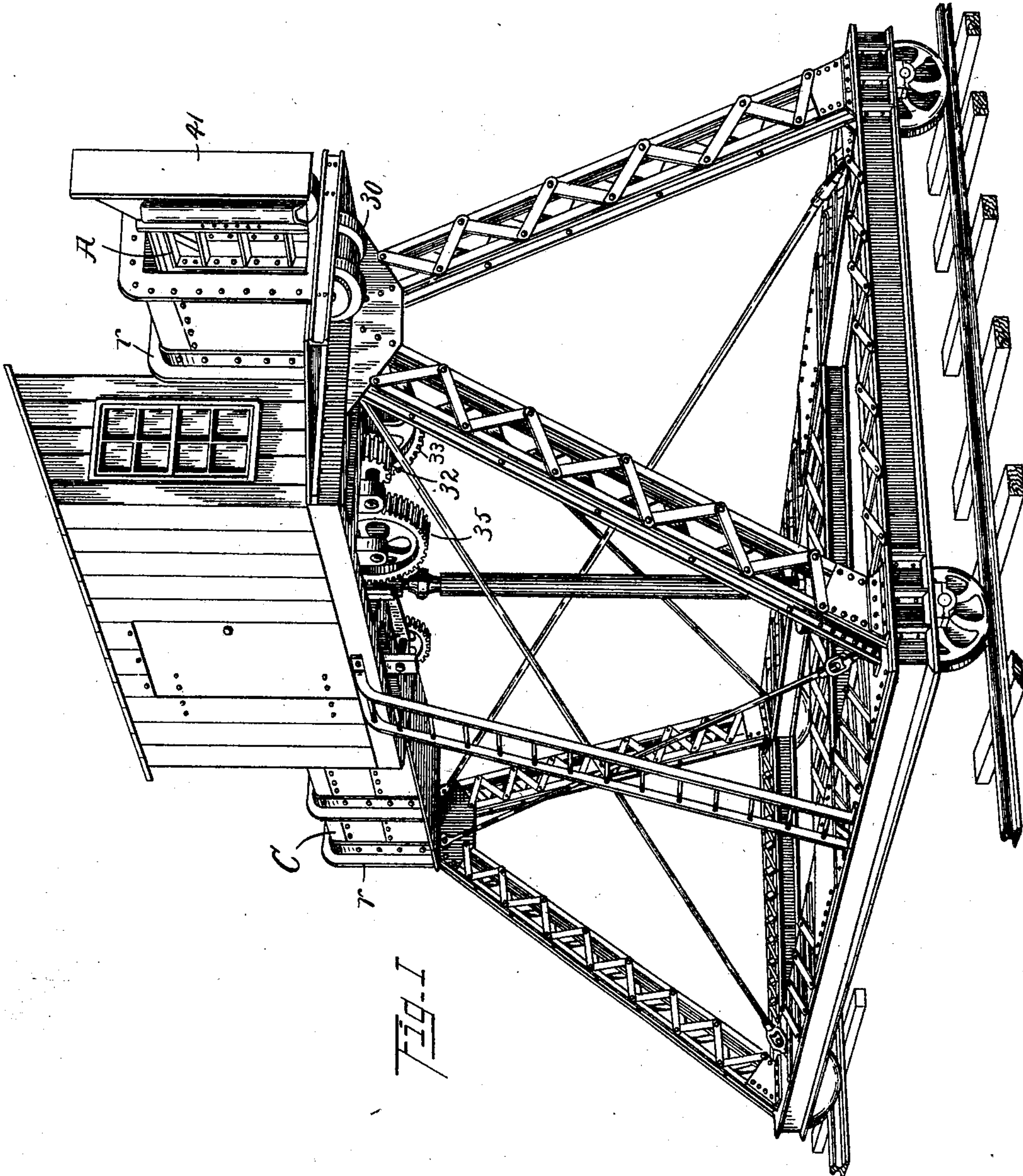
Patented Feb. 27, 1900.

A. E. BROWN.  
COKE PUSHER.

(Application filed Apr. 26, 1899.)

(No Model.)

5 Sheets—Sheet 1.



WITNESSES:

*H. G. Siswold*

*J. H. Tallman*

INVENTOR

*Alexander E. Brown*

BY

*George C. Wing*  
ATTORNEY.

**No. 644,053.**

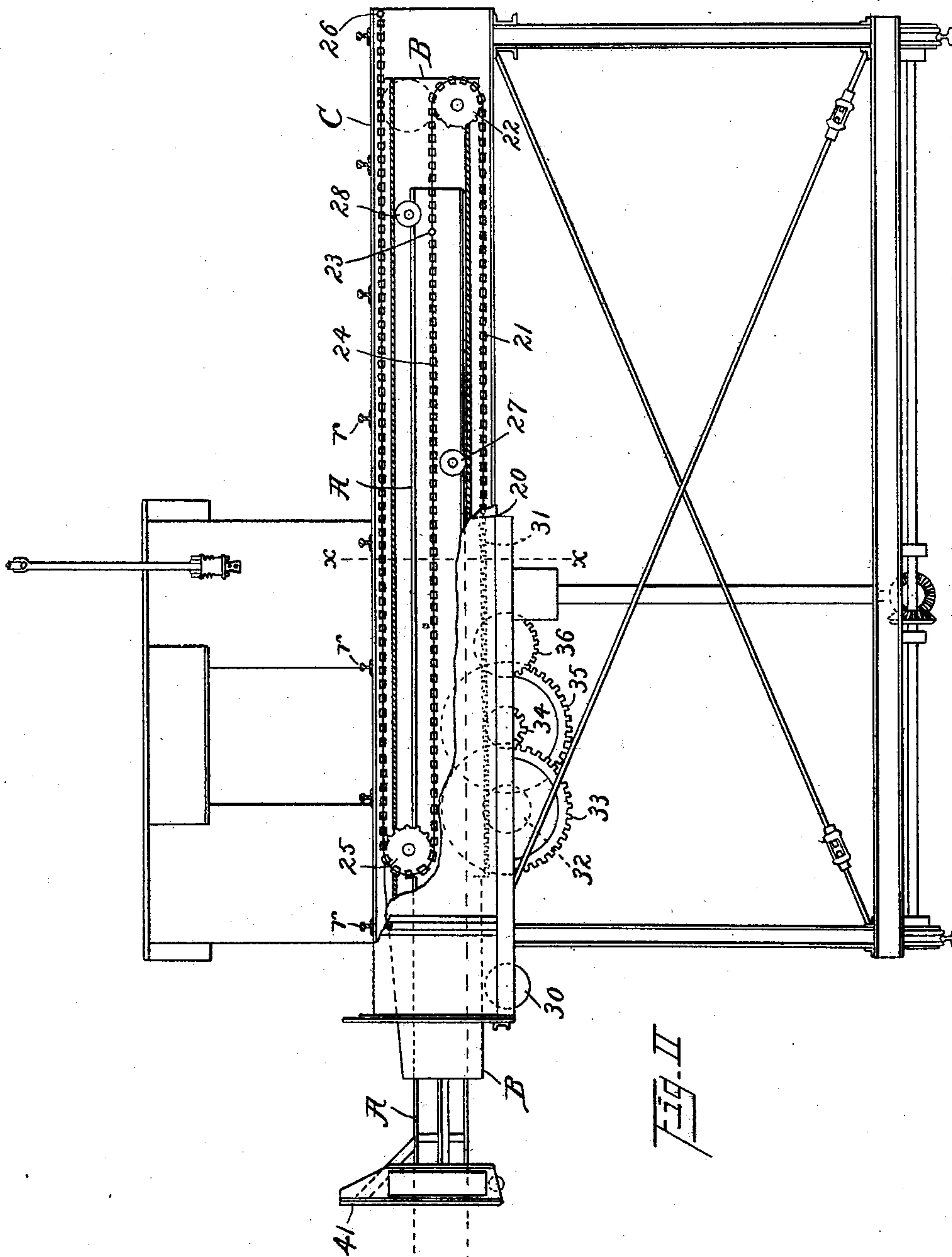
**Patented Feb. 27, 1900.**

**A. E. BROWN.**  
**COKE PUSHER.**

(Application filed Apr. 26, 1899.)

(No Model.)

**5 Sheets—Sheet 2.**



**WITNESSES:**

H. Griswold  
H. S. Tallman.

**INVENTOR**

INVENTOR  
Alexander E. Brown

BY

George C. Wing  
ATTORNEY.



No. 644,053.

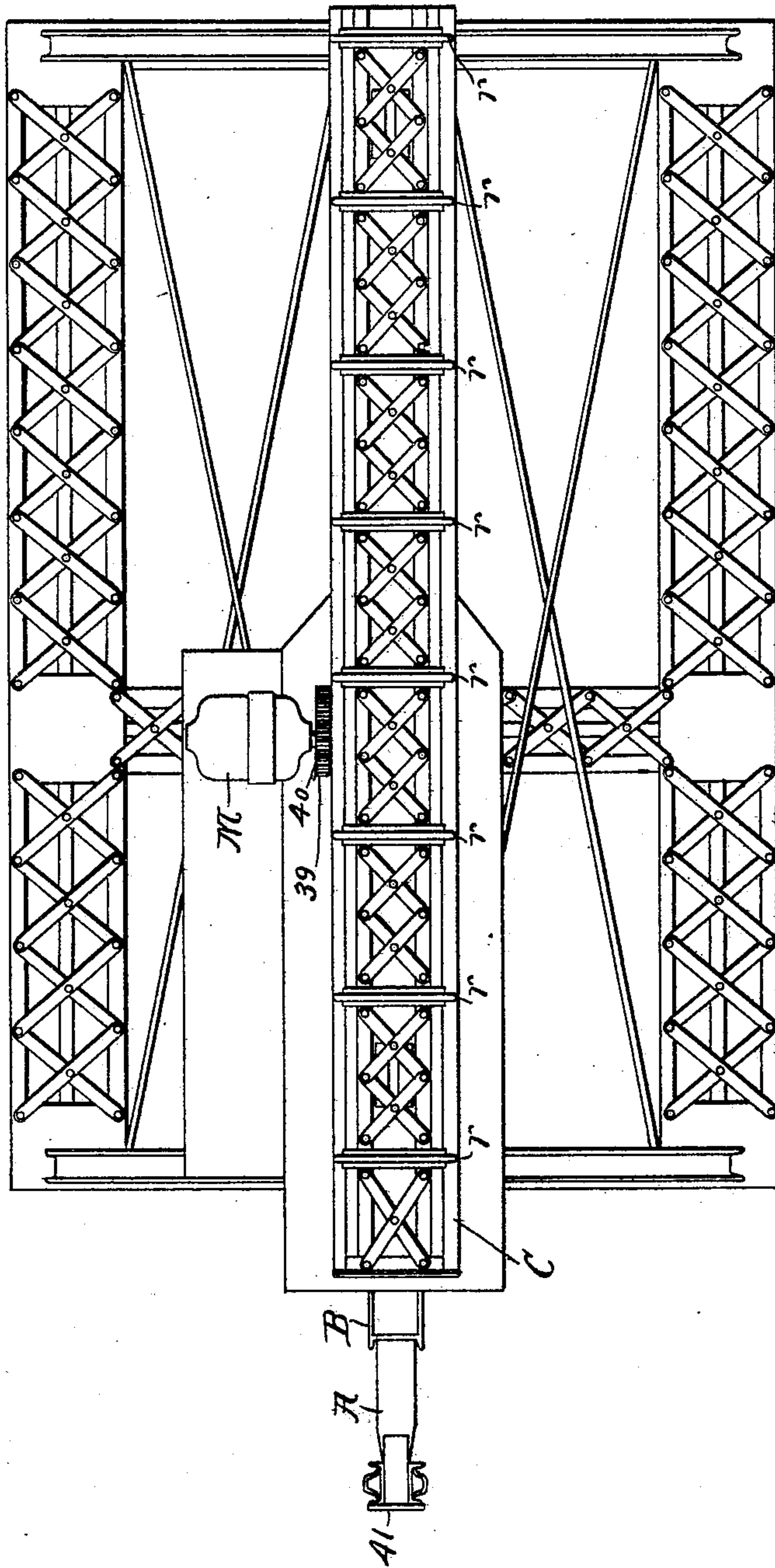
Patented Feb. 27, 1900.

A. E. BROWN.  
COKE PUSHER.

(Application filed Apr. 26, 1899.)

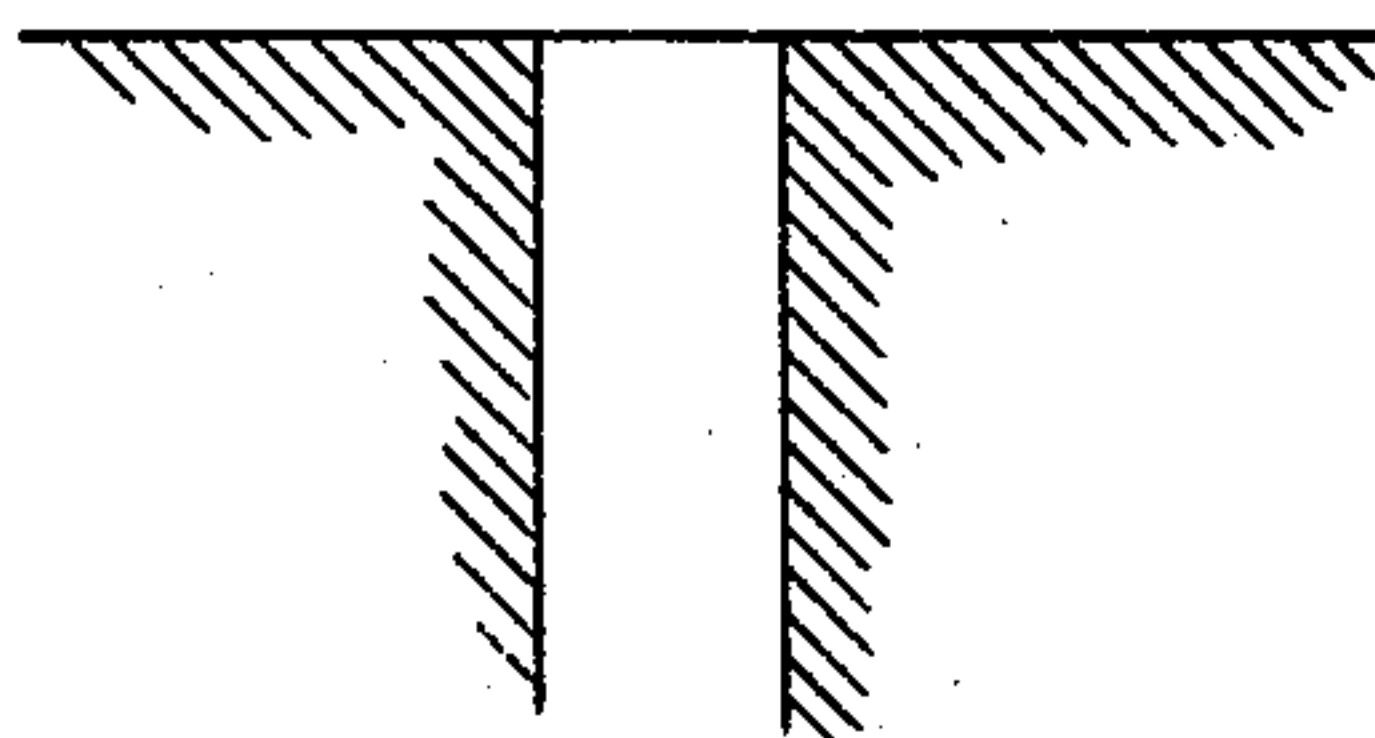
(No Model.)

5 Sheets—Sheet 3.



WITNESSES:

*H. G. Grewold*  
*H. G. Tallman*



INVENTOR

*Alexander E. Brown*

BY

*Georn C. Wing*  
ATTORNEY.

No. 644,053.

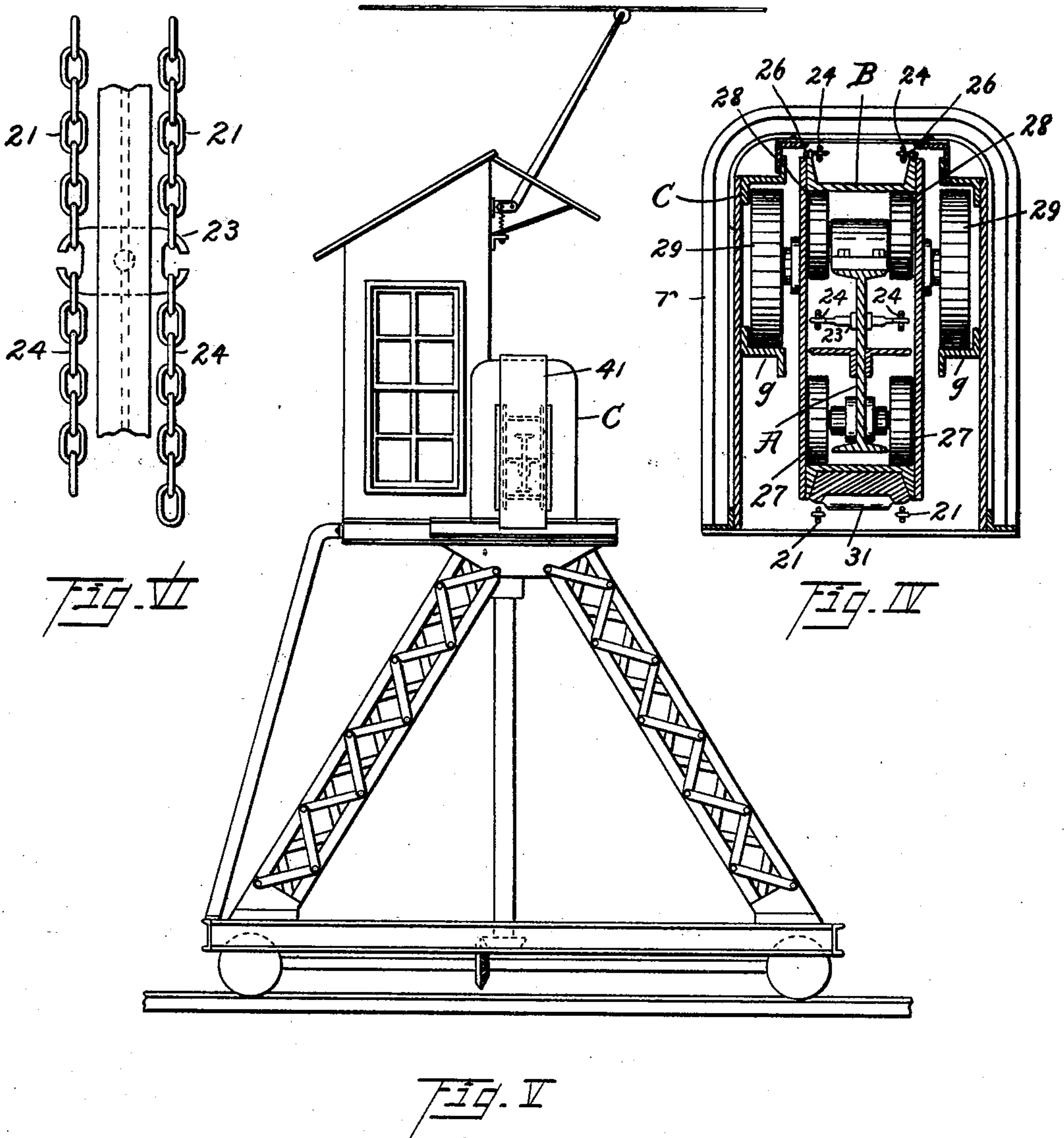
Patented Feb. 27, 1900.

A. E. BROWN.  
COKE PUSHER.

(Application filed Apr. 26, 1899.)

(No Model.)

5 Sheets—Sheet 4.



WITNESSES:

*H. Griswold*  
*H. G. Tallman*

INVENTOR

*Alexander E. Brown*

BY

*Sam C. Wing*  
ATTORNEY.

No. 644,053.

Patented Feb. 27, 1900.

A. E. BROWN.  
COKE PUSHER.

(Application filed Apr. 26, 1899.)

(No Model.)

5 Sheets—Sheet 5.

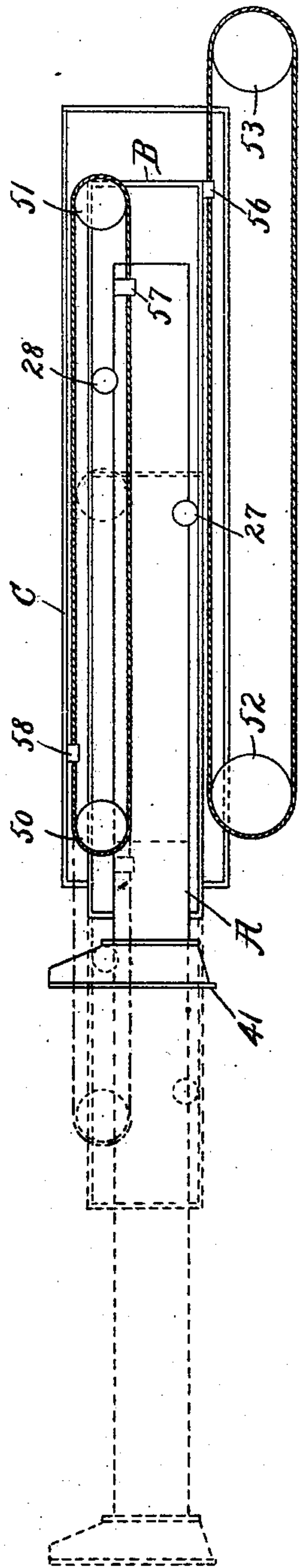


FIG. VII

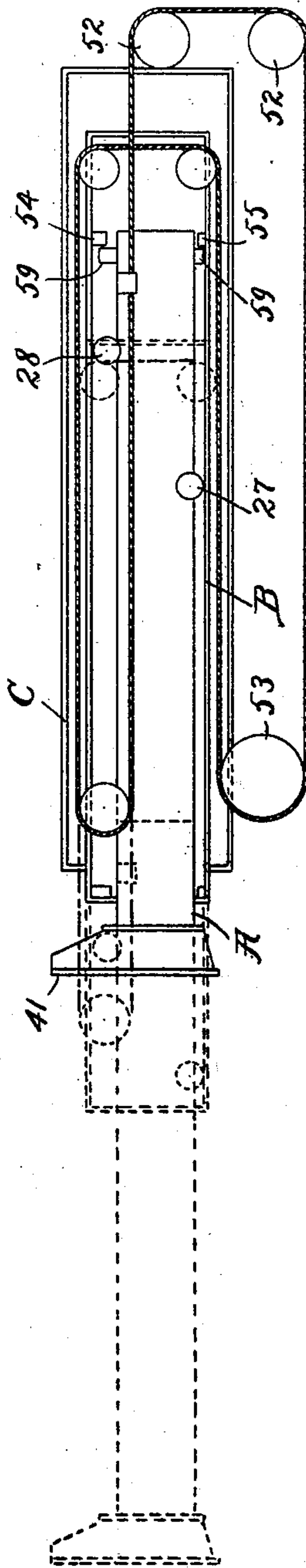


FIG. VIII

WITNESSES:

*A. Griswold*  
*P. G. Tallman*

INVENTOR

*Alexander E. Brown*  
BY  
*George C. Wing*  
ATTORNEY.



# UNITED STATES PATENT OFFICE.

ALEXANDER E. BROWN, OF CLEVELAND, OHIO.

## COKE-PUSHER.

SPECIFICATION forming part of Letters Patent No. 644,053, dated February 27, 1900.

Application filed April 26, 1899. Serial No. 714,519. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER E. BROWN, a citizen of the United States, residing in the city of Cleveland and county of Cuyahoga, in the State of Ohio, have invented a new and useful Improvement in Coke-Pusher Machines; and I hereby declare the following to be a full, clear, and exact description of the same.

My said invention belongs to that class of apparatus or appliances for extracting coke from coke-ovens, and more particularly from the so-called "Otto-Hoffman" or "Belgian" type of oven, which has openings or doors on opposite sides of the same through which a pusher may be introduced and the charge forced out. Hitherto the principal apparatus or machine for the purpose has consisted of a pusher bar or ram mounted horizontally upon a low supporting-frame, which frame was in turn mounted and adapted to travel upon tracks along the front of the ovens located on an elevated pier or trestle of suitable height to bring the pusher-bar on a level with the oven-door. In these devices the pusher-bar itself was adapted to oscillate longitudinally on its frame into and through the oven to clear the same of the coke. From the nature of things such pusher-bars are necessarily of such extreme length that in order to avoid overbalancing during their operation at least one half of the same should rest upon the supporting-frame and the remaining and forward portion of the bar should suffice to penetrate through the oven to which it was applied. The length thus required for a pusher-bar of the above type is so great that when withdrawn from an oven its rear portion must greatly overhang the frame and require a large additional space at the rear of the supporting-frame and trestle for the purpose. It is evident, therefore, that coke-pushers constructed on the above plan must require an undue allowance of a plant's space to be exclusively appropriated for their operation, and in addition to considerations of the expense thus involved it is a practical objection to this kind of construction that such allowance of space is not always available, and also that when there is more than one set of ovens of the biproduct class the width of the operating-strip referred to necessitates longer

underground or other gas flues, with a consequent undesirable increase of gas condensation during its transit through the same.

It is the end and aim of my present invention to provide a coke-pusher of a design that shall greatly reduce the clear space hitherto required in the operation of implements of this nature and which at the same time shall be capable of being moved in front of the ovens upon its rails without need of any special elevated pier, trestle, or similar foundation for the said rails and track.

The device and apparatus by which I accomplish the end above referred to is illustrated by the drawings in the several figures which accompany and are a part of this specification, and I shall now proceed to describe said apparatus more particularly, together with the said drawings embodying the invention I claim.

In the drawings, Figure I is a semi side view in perspective of the pusher apparatus as a whole. Fig. II is an outline side view showing the operative parts thereof, the apparatus being represented as broken for the purpose. Fig. III is a downward plan view with the operator's house shown in Fig. I removed; Fig. IV, a transverse sectional view on the line  $x x$  of Fig. II; Fig. V, a front view. Fig. VI represents a special form of anchorage that may be employed in the construction, and Figs. VII and VIII are diagrammatic views of special forms or adaptations of the said invention.

Each figure has the parts common to those of the other figures designated by the same letters or numerals.

The operative parts of my said apparatus are contained in and supported by a frame-like structure consisting of the steel box-girder C, mounted upon a movable truck or platform by suitable connecting-legs, as appears in Fig. I. Said box-girder C is open at the front or oven end and also through a portion of its under side. As also appears in the figures, it is properly stiffened by a series of rail or angle-iron stiffeners  $r r$  and is provided with the interior guide-tracks  $g g$ . The truck-frame, as well as the legs that are represented in Fig. I as connecting the same with the box-girder C, are there shown as made up of lattice beam-girders, with suitable rollers or



track-wheels at the several angles of the base or truck frame. The entire structure may be arranged to be driven along the tracks on which it is to operate by the same power that  
 5 actuates or drives the pushing mechanism of the same, hereinafter to be described. In the present instance said mechanism is assumed to be electrically driven through the motor, (indicated by M in Fig. III.) Within the said  
 10 box-girder C is located the hollow beam or bar B. Said beam B is provided on its under side and edges with racks 31 of suitable length to effect the desired motion of the beam B, hereinafter to be described, and with  
 15 the said rack 31 is meshed a pinion 32, connected to the source of power or motor M through the train of gears and pinions mounted on C and severally designated in the drawings by the numerals from 32 to 40, inclusive.  
 20 The beam B is further provided at its inner end with the track-rollers 29, which are journaled to its sides at such points and are adapted to move between the guide-tracks *g g*, Fig. IV, secured to the box-girder C for the  
 25 purpose. Journaled to C and bearing upon a suitable track or flange on B for the purpose is a roller 30, whereby support for the said beam B at its outer end is afforded.

A is the pusher-bar of the apparatus or the  
 30 ram proper. It is approximately of the same length as the beam B and of suitable dimensions to enable it to occupy the interior of the same, as hereinafter indicated.

The pusher-bar A is provided at its outer  
 35 end with a pusher-head 41 of suitable form and dimension to permit the same to be propelled through the oven-doors against the coke charges, and at a convenient point along its length the bar A is provided with the sup-  
 40 porting-rollers 27, which are secured to and journaled upon the same. The rollers 27 rest upon a flange or track on or near the lower side edge of the beam B and serve to take the downward push or weight of the beam A.  
 45 Secured to the inner end of the beam A by journal-bearings are the rollers 28 for the purpose of taking the upward push due to the resultant action of gravity on the forward portion of said beam. Said upward push on  
 50 the rollers 28 is sustained by a suitable track or flange provided for the purpose along the upper portion of the beam B, and in this manner the beam A is always held in a constant position with respect to the beam B through-  
 55 out all its motion in and upon the same.

At the points 20 on the lower edges of the box-girder C are respectively anchored the chains 21. Said chains are similar one to another and together constitute a pair, located  
 60 in parallel within said box-girder C and identically related to C in every particular. Said chains 21 pass over the sheaves 22, which are journaled in the beam B for the purpose, and thence pass and are secured to an equalizing  
 65 anchoring device 23, pivoted to the ram-bar A. Said device 23 and the leads of the several chains attached thereto are indicated in

Fig. VI. It is but one of several methods of making the requisite anchorage that may be employed. As appears in Fig. VI, a second  
 70 pair of chains 24 are also secured to the anchoring device 23. The chains 24 lead along the beam or bar A up over sheaves 25, journaled in the beam B for the purpose, and pass  
 75 backwardly to and are anchored at any convenient point 26 on the girder C, at or near the rear of the same.

Having thus described and located the various principal parts of the device shown, its operation can readily be understood by as-  
 80 suming the train of gears before referred to to be put in motion through the source of power or motor M until the pinion 32, meshed with the rack 31 on the beam B, communi-  
 85 cates to the beam B a movement toward the head 41 on the beam A. The effect of this movement is to carry along with the beam B the chain-sheaves 22 and 25, mounted upon  
 90 the same. As the chain 24 is anchored to the beam A at 23 and passes over the sheave 25 to the anchorage 26 on or near the rear end of the movable frame C it is apparent that  
 95 the anchor-point 23 will move forward simultaneously with the beam B; but by reason of the chain 24 passing over the sheave 25 and having one end thereof anchored against mo-  
 100 tion the other end of chain 24 or the anchor-point 23 will necessarily advance two units of distance while the sheave 25 or the beam B, actuated by the rack and pinion of the  
 105 same, advances but one unit. Now as the anchorage 23 is permanently fixed to the beam A it will be seen that for this reason the beam A will advance two parts while  
 110 the beam B advances one in relation to the fixed frame of the structure or its initial position, and therefore through the said chain and gear connections the elements A and  
 115 B, together making up and constituting the pusher-bar proper, are carried forward to the limit of travel prescribed for each of the said members. In the same manner and at  
 120 the same time the chain 21, one end of which, like that of chain 24, is fastened to the frame C at the anchorage 20 and the other end of which is fastened to the anchorage 23 on the  
 125 beam A, after passing over the sheave 22 on the rear end of the beam B must let out two units of its length for one unit advance of the beam B and the sheave 22. In other words, the chain 21 has the same motion at its anchorage end 23 as the chain 24 at all times  
 130 has. Again, if the motor M and the mechanism controlled thereby be reversed, so as to cause the racks and the beam B to move in the opposite direction to that just described, it is apparent that the chain 21, through the sheaves 22 on the rear of the ram, will pull on the same and on the anchorages 20 and 23 of the same, and inasmuch as the anchorage 20 on the immovable or fixed frame C is itself  
 135 immovable it follows that the other end of the chain, which is fixed to the anchorage 23 on the movable bar A, will pull this latter bar



in or toward the sheave 22 and at twice the speed of the sheave 22 or the bar B in relation to the fixed frame C. By this means, therefore, the bars or beams A and B are returned to their original or normal position with respect to the frame C from a position in advance thereof, into which they have been impelled by the operation already described. It is likewise apparent that the chain 24 follows up this motion, through its anchorage 23, in the same manner as was described as the action of the chain 21 in following up the forward pulling action of chain 24 in effecting the advance or pushing motion of the beams A and B in relation to the fixed girder or frame C.

From the descriptions above given of the motions of the bars or beams A and B in relation to the frame C and the coke-ovens to which the same are applied it will be seen that the distance in each direction through which the head 41 of the bar or beam A travels is much greater than the length of either of the bars or beams A or B or of the supporting frame or girder C, and that in consequence the space outside of the ovens which is required for the operation of my said coke-pusher apparatus need not be greater in the direction of the bars A and B than the length of those bars when in their normal or withdrawn position within the box-girder or frame C.

Although I have hereinbefore shown a device wherein the relative movements are effected by specific mechanisms that operate to produce a motion of the end or pusher section corresponding to the beam A at twice the velocity of the outer or incasing section corresponding to the beam B, nevertheless, without departing from the essential features of my invention, a modification of the invention specified may be made, whereby the forward motion of the said end or pusher section shall have a velocity capacity of three or more times that of the said outer or incasing section, or wherein more than two movable ram-sections enter into the construction; also, wherein the necessary longitudinal movements of the ram portions are produced by wire ropes or chains in connection with fixed drums and sheaves instead of by means of racks and pinions. Such latter form of construction is indicated in Fig. VII, wherein 52 and 53 are drums carrying a chain L, fastened to the beam B at a point 56 at the rear of the same. In Fig. VII a chain M is anchored at 57 on the rear portion of the beam A and passes backwardly up over the sheave 51, fixed on the beam B, to the anchor-point 58, and another chain N passes from the same anchor-point 57 forwardly to and up over the sheave 50 upon the front end of the beam B to said anchor-point 58.

Fig. VIII indicates a further modification of my invention, wherein the chain P, passing over the actuating-drum 53 and sheave or sheaves 52, is fastened to the rear end of

the beam A instead of to the beam B, as in the other forms shown. It results that in this form of construction the forward or backward movement of the beam A is effected to its full extent before any movement of the beam B occurs. At 59 on the beam A are provided suitable stops adapted to bring up against corresponding stops or bearings 54 55 on the interior of the beam B when the beam A has reached either limit of its motion with respect to the beam B, whereupon at such limit the actuating mechanisms shown in Fig. VIII will then advance or withdraw the beam B, as the case may be, without further independent movement on the part of the beam A.

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

1. In an apparatus for charging or drawing coke-ovens, open-hearth or steel-heating furnaces, and the like, the combination of a frame or supporting structure, and a pusher bar or ram composed of sectional members, one of which members rests and is movable horizontally upon said frame or supporting structure, upon or against rollers or similar rotating supports or bearings provided for the purpose, and the other of which members rests upon the first named of said members, upon or against like rollers or rotating supports or bearings; sheaves or similar appliances, at the rear and forward portions respectively of said first-named member, and chains, or like devices, fastened to the rear portion of said second-named member, and, respectively, to the rear and forward portions of said frame or structure, which chains, in one case, pass over said sheave or sheaves at said rear portion, and, in the other case, pass over said sheave or sheaves at said forward portion of said first-named member, together with suitable means for actuating said first-named member horizontally forward and back on said frame or supporting structure, substantially as shown and described.

2. In an apparatus for charging or drawing coke-ovens, open-hearth or steel-heating furnaces, and the like, the combination of the box-girder C, having a suitable frame or supporting structure, the hollow beam or bar B, horizontally mounted on said box-girder C upon and against rollers as described; the pusher-bar A, mounted upon or within said beam or bar B, upon and against rollers provided for the purpose likewise as described, and sheaves 22 and 25 journaled in said beam or bar B at its rear and forward portions, respectively, and chains 21 passing over the sheaves 22 and anchored at one end to the rear portion of the pusher-bar A, and at the other end to the girder C, or its frame or support at or near the point described; chains 24 passing over the sheave 25, and anchored, at one end, to the rear portion of the pusher-bar A, and at the other end, to the rear portion of the girder C, or its frame or support,



together with suitable means for actuating said beam or bar B forward and back upon said girder C, substantially as shown and described.

5 3. In an apparatus for charging or drawing coke-ovens, open-hearth or steel-heating fur-  
naces, and the like, the combination of the  
box-girder C horizontally mounted upon a  
suitable frame or supporting structure pro-  
10 vided for the purpose, the hollow beam, or bar,  
B having racks 31 and pinions 32, meshing  
therewith; the track-rollers 29, journaled to  
the sides of the beam or bar B, at its inner  
end, and resting on the girder-tracks *g*, pro-  
15 vided for the purpose; the rollers 30, jour-  
naled to the outer end of said beam or bar,  
as described, the pusher-bar A, provided with  
supporting-rollers 27, resting on flanges or  
tracks, provided for the purpose, on or near  
20 the lower side edges of the beam or bar B,  
and the rollers 28 bearing against suitable  
tracks along the upper portion of said beam  
or bar B, sheaves 22 and 25 journaled in said  
beam or bar B at its rear and forward por-  
25 tions respectively; chains 21, anchored, at  
one end, to the girder C, as described, which  
pass over the sheaves 22 and are anchored at  
their other end to the rear portion of the  
pusher-bar A; chains 24, anchored, at one  
30 end, to the rear portion of the pusher-bar A,  
which pass up over the sheaves 25 and are  
anchored, at their other end, to the girder C  
at its rear portion, together with a suitable  
gear system, in train with the pinion 32, and  
35 connected with a source of power, substan-  
tially as shown and described.

4. In an apparatus for drawing coke-ovens,  
open-hearth or steel-heating furnaces, and  
the like, the combination of a frame or sup-  
40 porting structure and a pusher bar or ram  
composed of sectional members, one of which  
rests upon said frame or supporting struc-  
ture, upon or against rollers or similar rotat-  
ing supports or bearings, provided for the

purpose, and the other of which rests upon 45  
the first-named of said members, upon or  
against like rollers or rotating supports or  
bearings; sheaves or similar appliances on the  
rear and forward portions of the first-named  
of said members, and chains, or like devices, 50  
anchored to the rear portion of the second-  
named of said members, one of which chains  
or set of chains passes up and over the said  
sheave on the said rear portion, to and is an-  
chored at the forward portion of said first- 55  
named member, and the other of said chains  
passes up and over the said sheave on the said  
forward portion of said first-named member  
to and is anchored at the forward portion of  
said first-named member, together with a 60  
drum, or like device, connected with suitable  
driving mechanism and a chain, or similar  
band or like device, which passes around said  
drum and an oppositely-related sheave or  
drum provided for the purpose, and is fas- 65  
tened to the first above-named member at the  
rear of the same, substantially as shown and  
described.

5. In an apparatus for charging and draw-  
ing coke-ovens, open-hearth or steel-heating 70  
furnaces, and the like, the combination of a  
frame or supporting structure and the beam  
or bar B mounted on said frame or structure  
upon and against rollers, as described, the  
pusher-bar A mounted upon or within said 75  
beam or bar B upon and against rollers, like-  
wise as described, the actuating-drum 53<sup>a</sup>,  
the sheaves 50<sup>a</sup>, 51<sup>a</sup>, 51<sup>b</sup>, 52<sup>a</sup>, 52<sup>b</sup>, the con-  
tinuous chain or cable P, fastened to the rear  
end of the bar A, together with the stops 59 80  
on said bar A, and the stops or bearings 54  
and 55 on the beam B, and suitable means  
for actuating said drum 53<sup>a</sup>, substantially as  
shown and described.

ALEXANDER E. BROWN.

Witnesses:

F. G. TALLMAN,  
L. F. GRISWOLD.