

No. 753,142.

PATENTED FEB. 23, 1904.

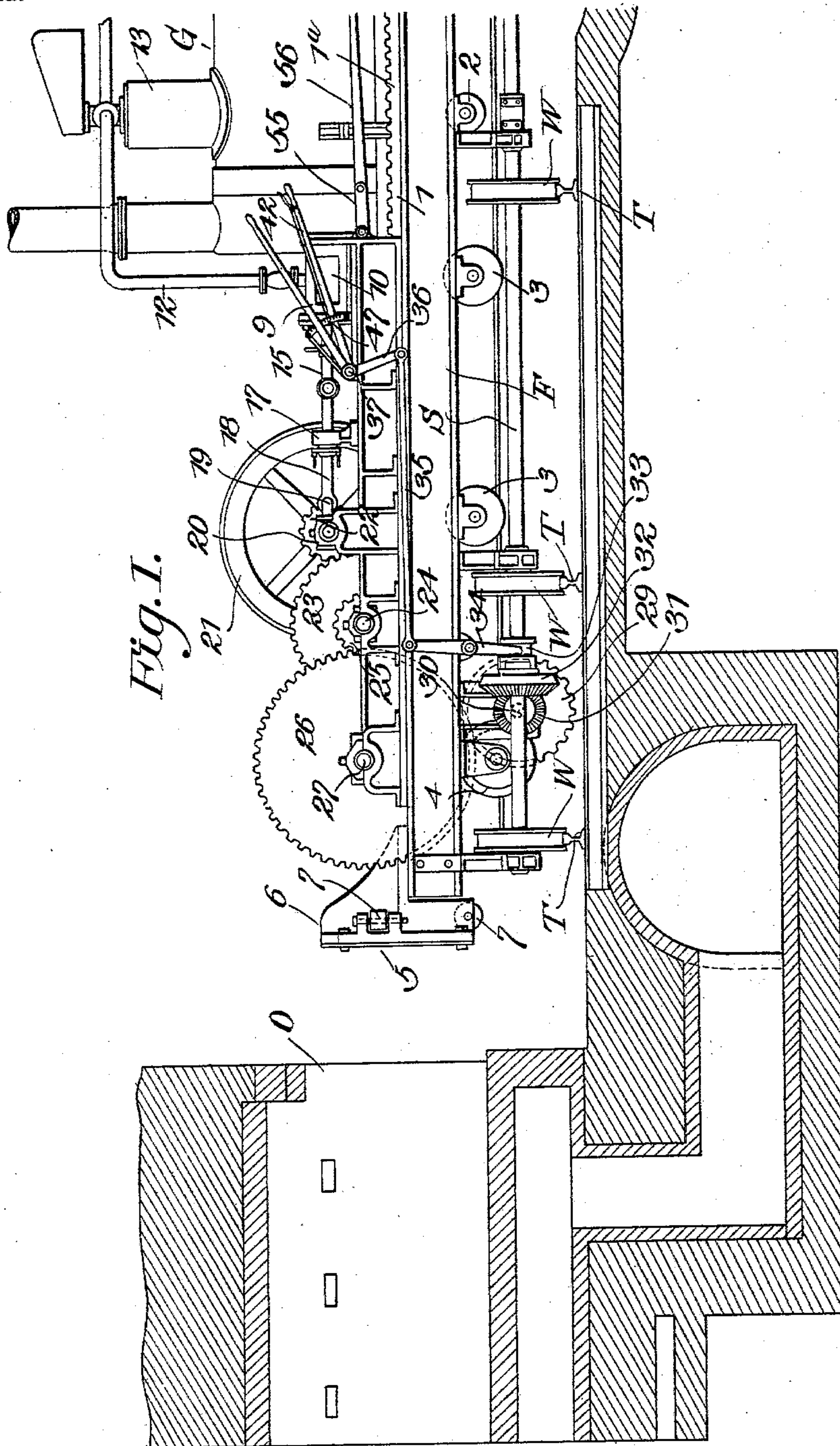
J. KERSHGENS.

MACHINE FOR DISCHARGING COKE FROM OVENS.

APPLICATION FILED JUNE 30, 1903.

NO MODEL.

6 SHEETS—SHEET 1.



Witnesses
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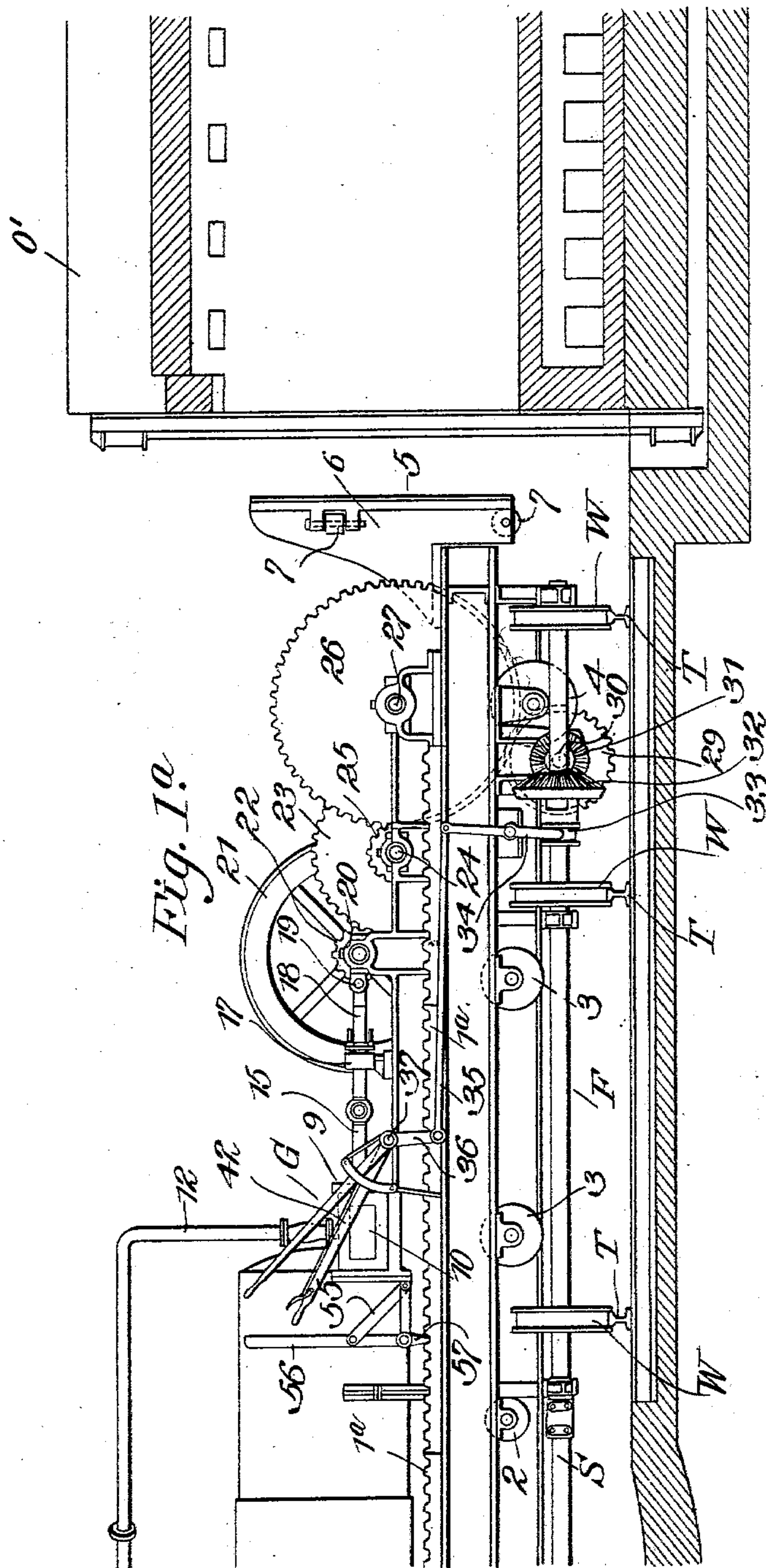
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Witnesses
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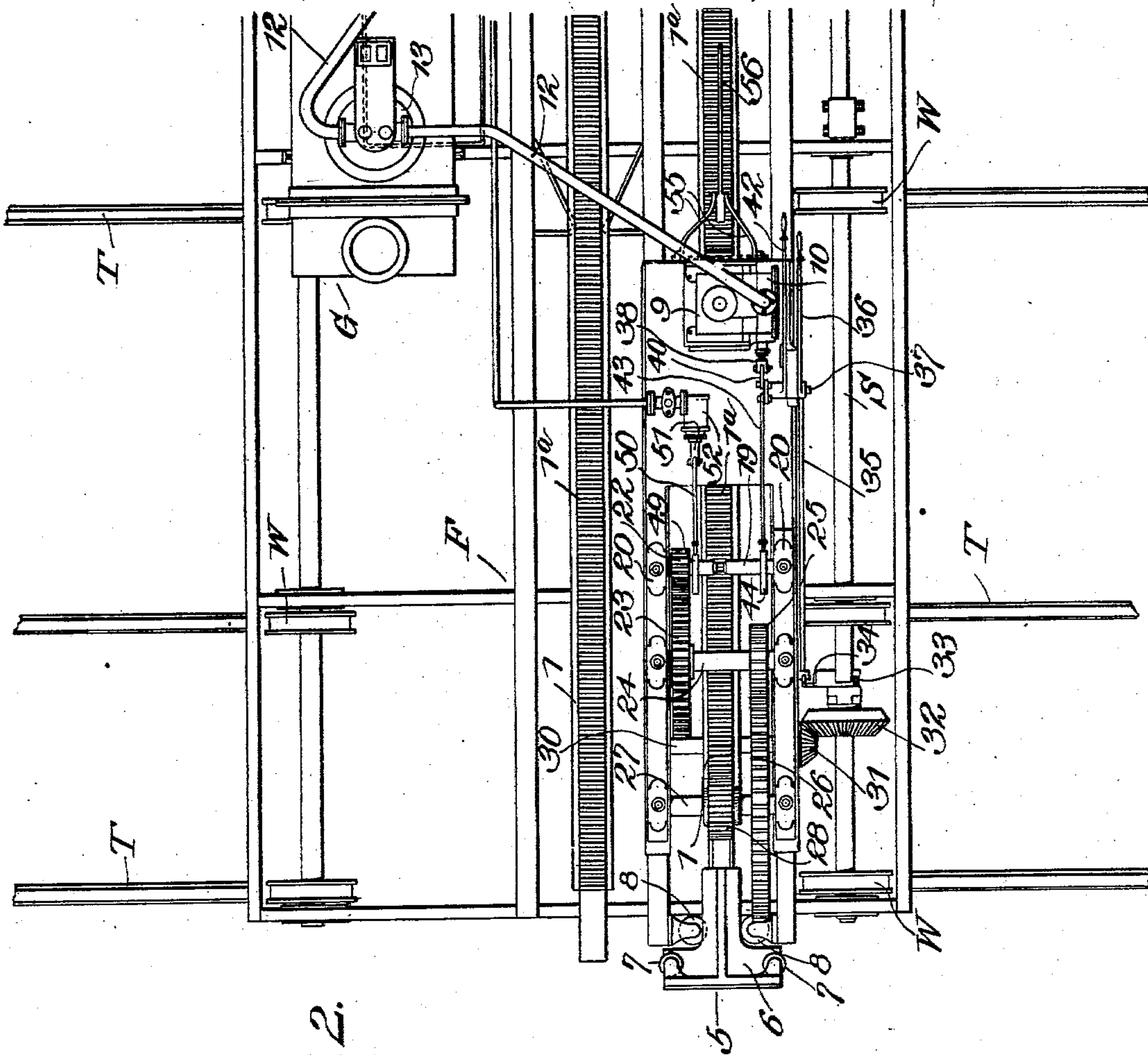
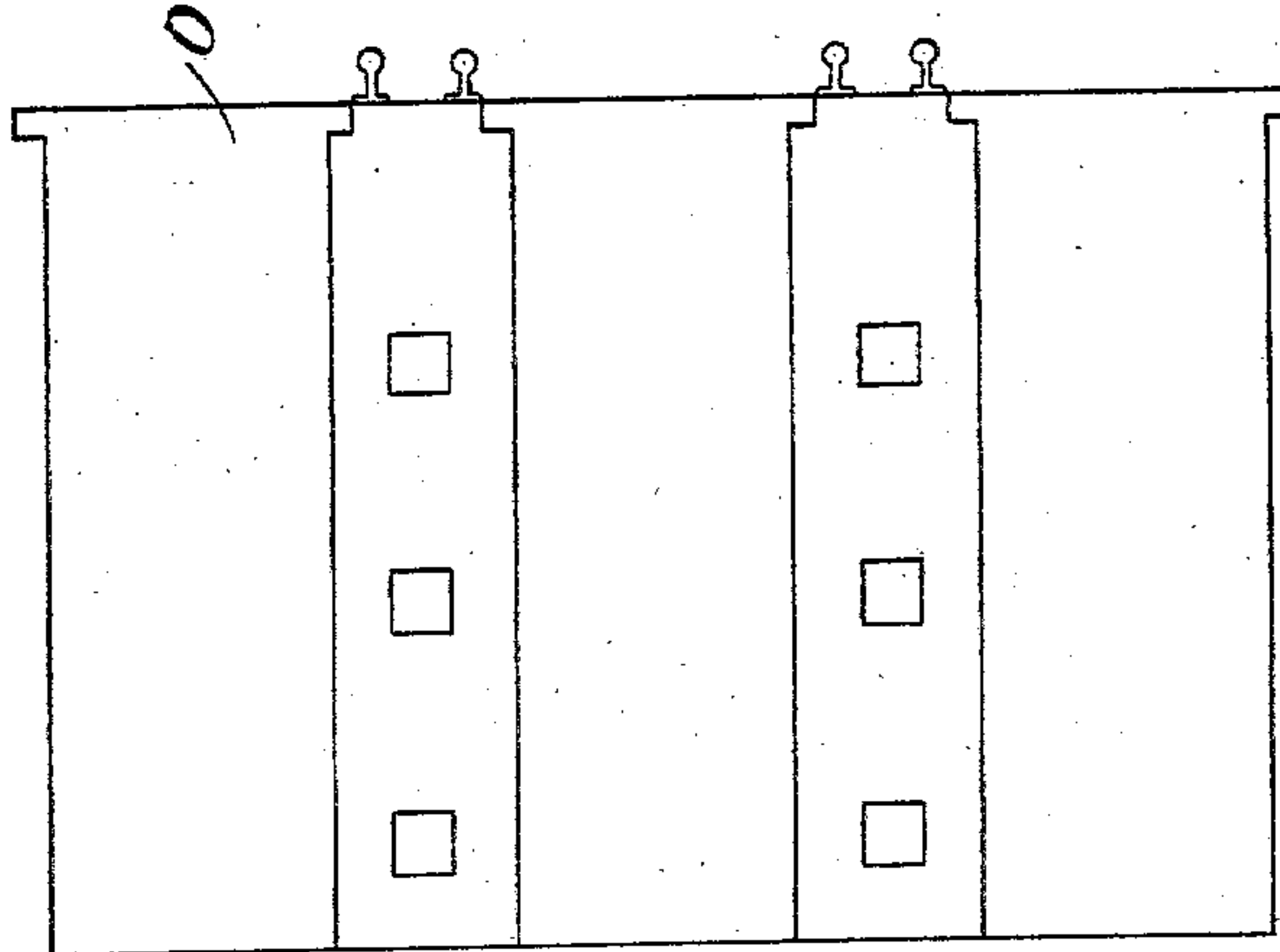


Fig. 2.



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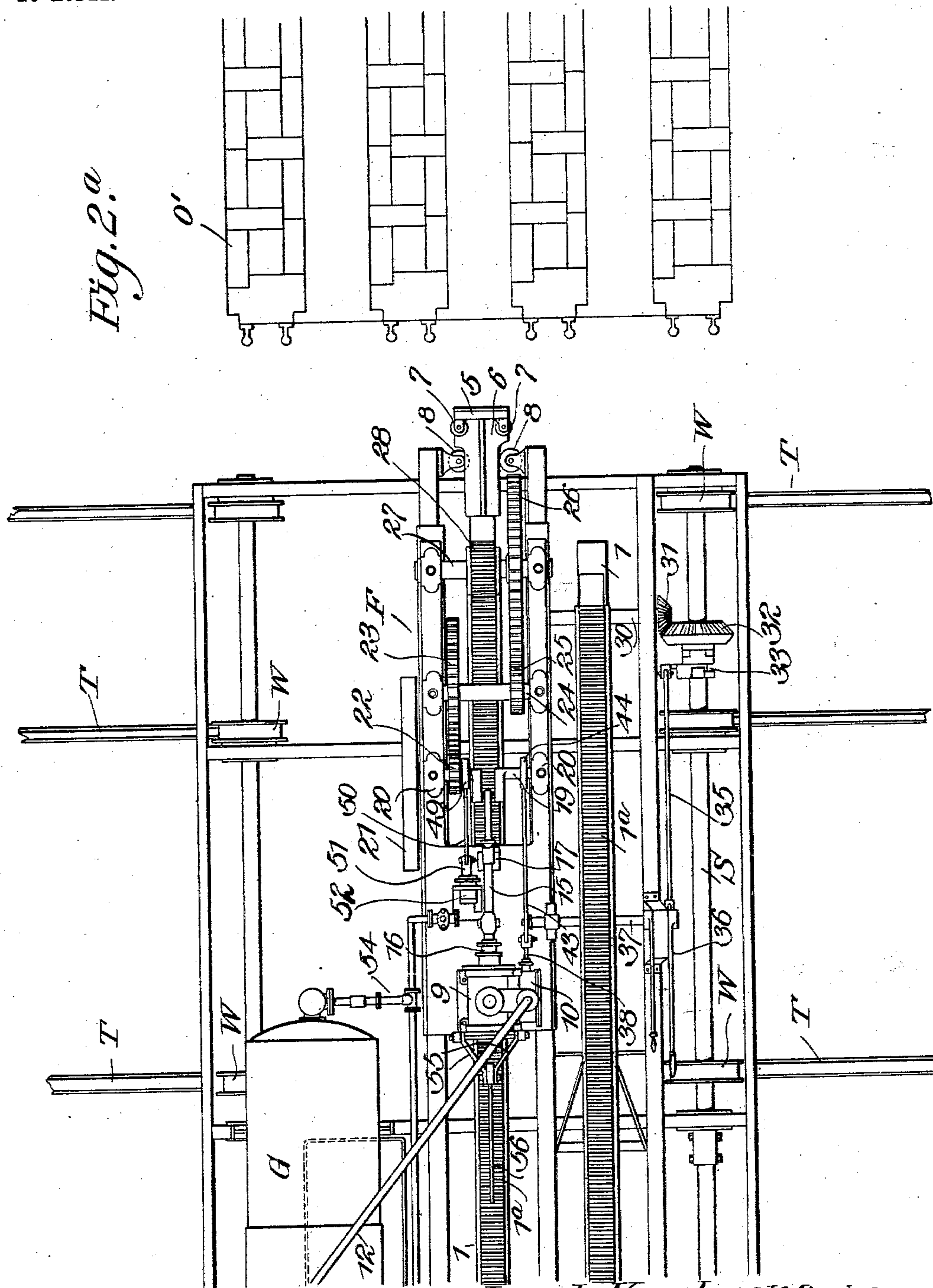
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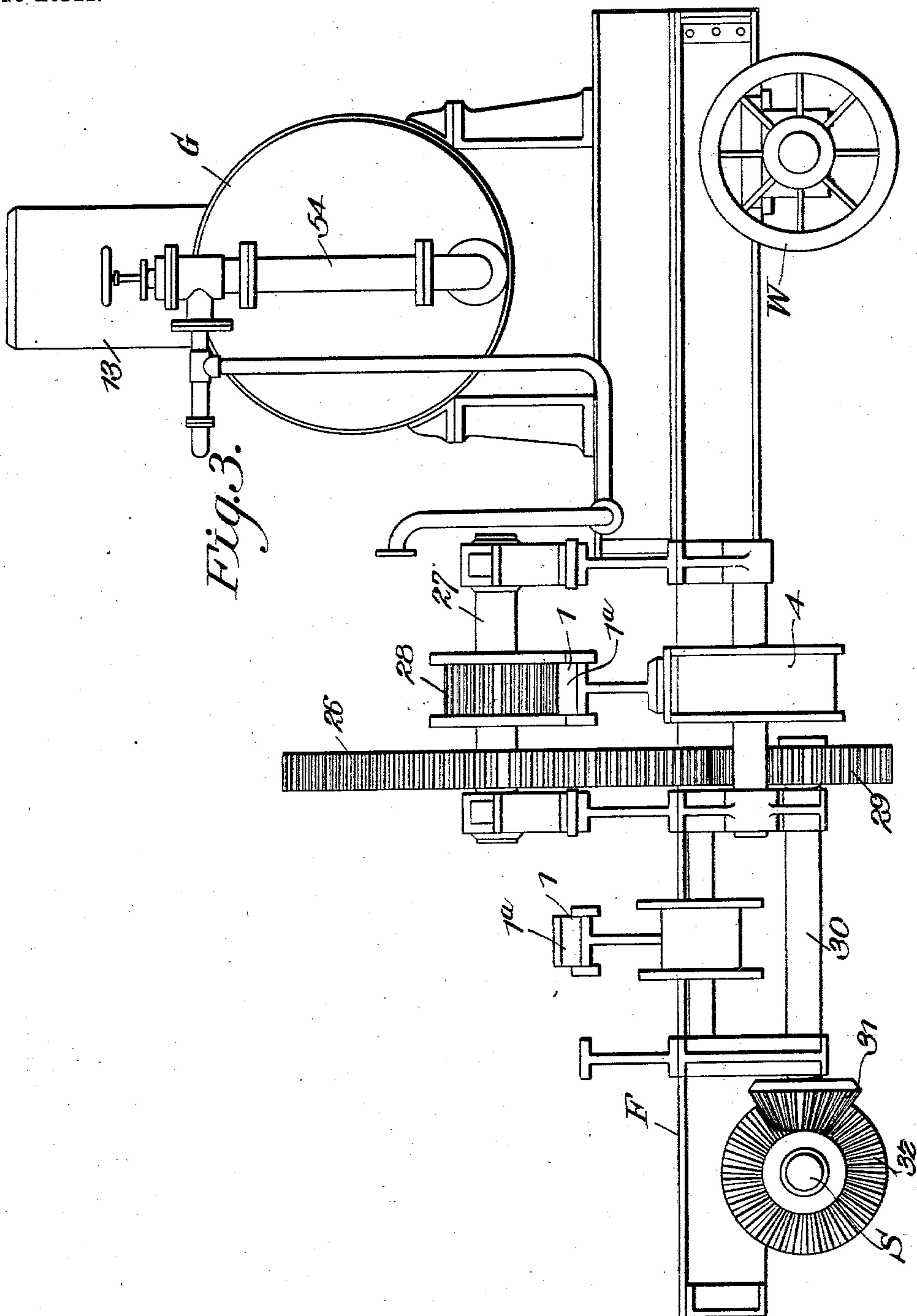
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6 SHEETS—SHEET 5.

NO MODEL.



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6 SHEETS—SHEET 6.

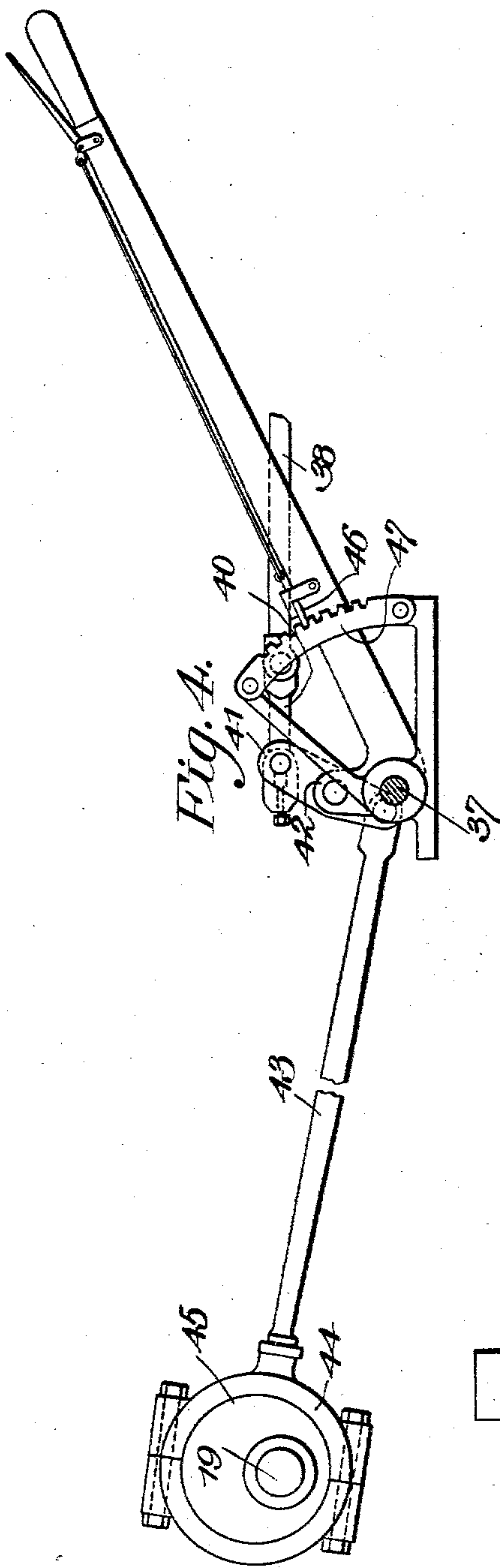


Fig. 4.

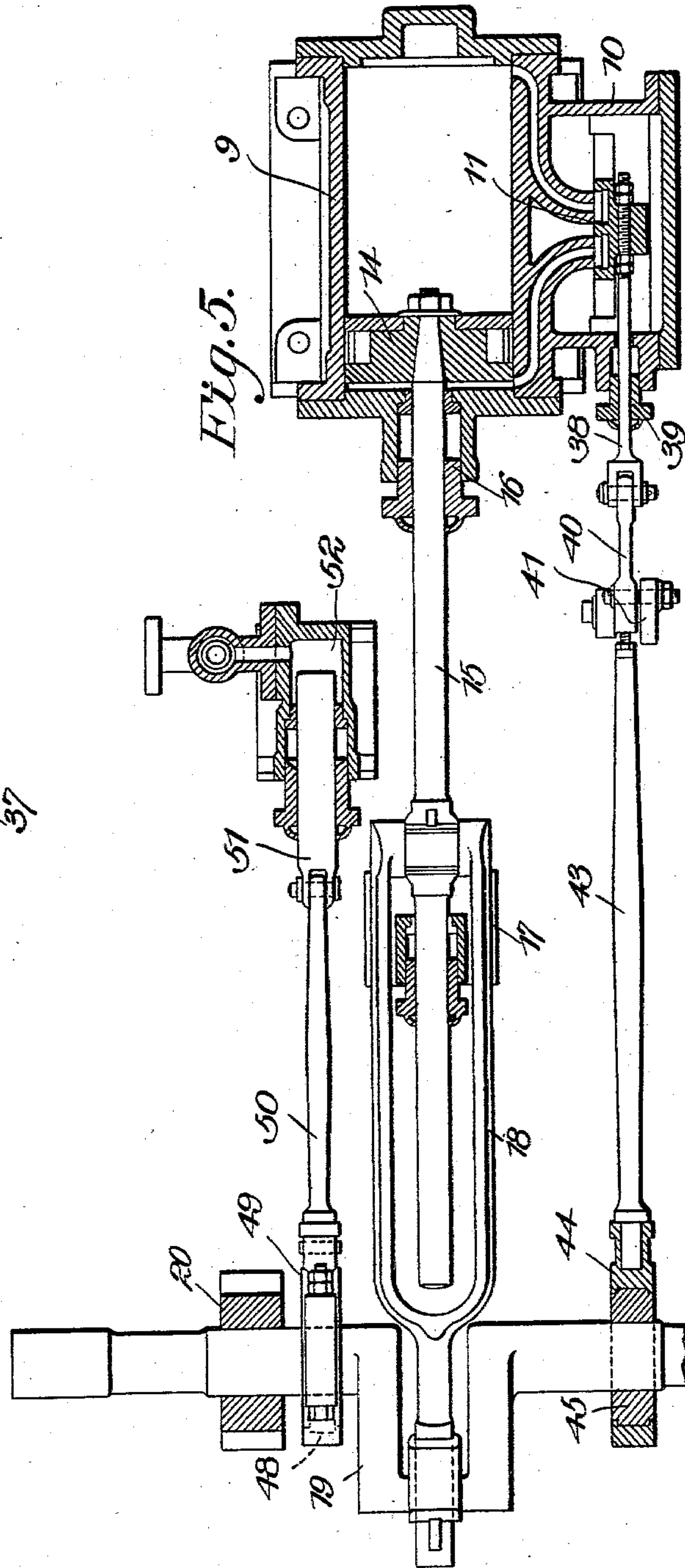


Fig. 5.

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UNITED STATES PATENT OFFICE.

JOSEPH KERSHGENS, OF CHARLEROI, PENNSYLVANIA.

MACHINE FOR DISCHARGING COKE FROM OVENS.

SPECIFICATION forming part of Letters Patent No. 753,142, dated February 23, 1904.

Application filed June 30, 1903. Serial No. 163,759. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH KERSHGENS, a citizen of the United States, residing at Charle-
roi, in the county of Washington and State of
5 Pennsylvania, have invented a new and useful
Machine for Discharging Coke from Ovens,
of which the following is a specification.

This invention relates generally to machines
for discharging coke from the ovens in which
10 it is made, and more particularly to machines
adapted to travel upon tracks laid between
parallel rows of oppositely-disposed ovens,
from which coke may be discharged simulta-
neously or separately, as desired.

15 The object of the invention is to produce an
improved coke-pushing machine of the type
specified in which the action will be simple
and easily controlled and which may be op-
erated with a comparatively small expendi-
20 ture of power.

In describing the invention reference will
be had to the accompanying drawings, form-
ing a part of this specification, in which is
illustrated one form of embodiment of the in-
25 vention, the same being shown in connection
with two rows of oppositely-disposed coke-
ovens, the ovens in one row being of a modern
type and those in the other row being of an
older type and the heads of the pusher-bars
30 of the machine being made of different forms
to correspond to the types of ovens shown.

In the drawings, Figure 1 is a view in ele-
vation from the rear of one end of the appa-
ratus, a coke-oven being shown in section in
35 its normal position in relation to the machine.
Fig. 1^a is a view similar to Fig. 1, showing
the other end of the machine in elevation
from the rear and showing in section a differ-
ent form of coke-oven in normal position in
40 relation to the machine. Fig. 2 is a plan
view of the end of the machine shown in Fig.
1 with a plurality of coke-ovens indicated
diagrammatically in relative position to that
end of the machine. Fig. 2^a is a plan view
45 of the end of the machine not shown in Fig. 2,
coke-ovens of a different type from those
shown in Fig. 2 being shown diagrammatically
in relation to the end of the machine. Fig. 3
is an end view of the machine from the right,
50 the view being on larger scale than the pre-

ceding views. Fig. 4 is a detail view in ele-
vation of one of the levers for controlling the
movements of the machine and of the parts
coöperating with the lever. Fig. 5 is a detail
view, partly in plan and partly in horizontal
55 section, through one of the cylinders for op-
erating one of the pusher-bars, showing the
means by which motion is imparted from the
cylinder to the crank-shaft and the valve for
controlling the direction of movement. 60

In the drawings corresponding parts are
designated by the same characters of reference
throughout the several views in which they
appear.

Referring now to the drawings, O O O rep- 65
resent ovens of the older type, and O' O' O'
represent ovens of more modern type. Tracks
T, preferably comprising six rails, are laid be-
tween the rows of coke-ovens, and upon these
tracks the machine is propelled by means of 70
mechanism forming a part of the machine and
comprising the elements presently to be de-
scribed.

The machine consists of a frame F, which
may be of any preferred form, but which is 75
preferably made of iron beams of the form
shown and which must be strongly constructed
to withstand the strains to which it is sub-
jected in the operation of the machine. The
frame is supported by a plurality of wheels 80
W, each of which is provided on its periphery
with a pair of flanges, between which is formed
a circumferential groove for engagement with
one of the rails of the track. The wheels at
the front of the frame are merely supporting- 85
wheels; but those at the rear are all rigidly
attached to a shaft S, to which power is trans-
mitted when it is desired to propel the ma-
chine forward along the rails.

On the front part of the frame of the ma- 90
chine is mounted a steam-generator G, com-
prising a boiler and fire-box of any preferred
form and having supported beneath it a water-
supply tank. The steam-generator G sup-
plies steam to cylinders in which operate pis- 95
tons from which power is supplied to mech-
anism for actuating the push-bars in the man-
ner presently to be described, and the steam-
cylinders furnish the power used to propel
the machine forward when the push-bars are 100

retracted after discharging coke from the ovens.

Arranged to reciprocate on the frame F are two push-bars 1 1, each of which is supported upon a plurality of alined rolls to diminish the friction of operation thereof. Each bar 1 rests upon a plurality of rolls, preferably eight in number, of which the two in the middle of the series are of smaller diameter than the remainder and are designated by the numeral 2. The rolls on either side of the rolls 2 of the series and designated 3 are of larger diameter and are provided with flanges sufficiently wide to form deep circumferential grooves, in which the push-bars are securely held against lateral movement. At one end of each series of rolls supporting one of the push-bars is a roll 4, larger than the rolls 3 and placed immediately beneath the gear, from which motion is imparted to the push-bar. Rolls 4 are provided to give a sufficiently firm support to the push-bars to prevent them from yielding under the strain imposed thereon by the gears for operating them and are made of large size to diminish the wear occasioned by the friction and heavy pressure of the push-bars thereon. Each of the push-bars 1 is provided on its upper surface with a plurality of cogged plates 1^a, securely bolted to the push-bars and forming a rack for the engagement of gears by means of which the push-bars are operated.

At one end each of the push-bars is provided with a pusher-head 5, consisting of a frame 6 and a plurality of rolls 7, two of which are mounted at the bottom of the head to revolve in a vertical plane and two of which are supported in brackets at the sides of the head to rotate in a horizontal plane and which serve by contact with the sides of the oven to hold the pusher-head in proper relation thereto. As additional means for retaining each of the push-bars in proper alinement a pair of rolls 8 are provided in brackets on opposite sides of each pusher-head 5 to engage therewith, as best seen in Fig. 2.

Supported upon a bed-plate above each of the push-bars 1 is a cylinder 9 of ordinary type, having at the rear side thereof a steam-chest 10, in which reciprocates a slide-valve 11. Steam is led into each of the steam-chests 10 by a steam-pipe 12, leading from the steam-dome 13 of the generator G. Mounted for reciprocation in each of the cylinders is a piston-head 14, rigidly attached, as usual, to a piston-rod 15, which slides in a stuffing-box 16 at the end of the cylinder and which has the free end thereof supported in a guide 17. Each of the pistons has connected therewith approximately midway between the ends the bifurcated end of a connecting-rod 18, the other end of which engages a crank-shaft 19, mounted in bearing-blocks 20 upon two of the transverse beams of the frame. Each crank-shaft 19 bears at the forward end thereof a fly-wheel 21 and also carries a small gear-

wheel or pinion 22, which is in mesh with a large gear 23 upon a short shaft 24, parallel to the crank-shaft 19. Each shaft 24 is provided with a small gear 25, which is in mesh with the large gear 26, mounted on a shaft 27, and each shaft 27 also carries a small gear 28, which is disposed above one of the push-bars 1 directly over its supporting-roll 4 and serves under conditions presently to be described to impart motion to the push-bar by engagement with the rack formed by the cogged plates 1^a on the upper surface thereof.

The large gear 26 on each shaft 27 meshes with a small gear 29 on a shaft 30, supported beneath the frame F in the plane of the driving-shaft S. Each shaft 30 also carries a bevel-gear 31, adapted to engage with a bevel-gear 32, which is splined to the driving-shaft S and has fastened to the hub thereof a grooved collar 33, with which engages the bifurcated end of a lever 34, pivotally mounted on the under side of the frame F in suitable relation to the collar. The upper end of each lever 34 has pivotally attached thereto a connecting-rod 35, which is fastened at its other end to an operating-lever 36, pivotally supported on a short shaft 37, provided for that purpose on the frame F. By means of the operating-levers 36 the levers 34 may be rocked and the gears 32 shifted back and forth upon the driving-shaft S to throw said gears into and out of engagement with the gears 31. When either of the gears 32 is in mesh with the corresponding gear 31 the driving-shaft S will be rotated if steam is allowed to enter the cylinder 9, from which power is transmitted to gear 31, which has its corresponding gear 32 in mesh therewith.

Each slide-valve 11 is operated by means of a valve-stem 38 of ordinary construction, which is bolted to the valve, as shown, and which slides in a stuffing-box 39 at the end of the steam-chest 10. Motion is imparted to the valve-stem 38 by a link 40, pivotally connected at one end to valve 11 and at the other to the inner end of a lever 41, which is mounted on a stud in the shorter arm of a bell-crank lever 42, which is mounted on the shaft 37. The lever 41 is rocked back and forth by a pitman 43, pivotally connected at one end to the lever 41 and at the other end secured to a strap 44, which encircles an eccentric disk 45 on the crank-shaft 19. The eccentric disk 45 is preferably rabbeted at the margin of each side face, and the strap is provided with corresponding internal flanges to engage with said rabbets to prevent the slipping of the strap on the eccentric. The bell-crank lever 42, which carries the stud upon which lever 41 is mounted, is provided with the locking-dog 46, which is adapted to engage with notches formed in a segmental rack 47 and serves to control the entry of steam into the cylinder 9 on the side of the machine upon which it is located. When bell-crank lever 42 is in the

position shown in solid lines in Fig. 4, the movement of the pitman 43, with the rotation of the eccentric 45, is not sufficient to move the flange 11 far enough in either direction to admit steam to the cylinder 9. Consequently when the bell-crank 42 is in the position referred to the piston is not caused to reciprocate within the cylinder, and no motion is imparted to the crank-shaft 19 and the mechanism operated therefrom.

If the bell-crank 42 is tilted so as to raise the free end thereof, the movement of the slide-valve 11, occasioned by the rotation of the eccentric disk 45, will uncover one of the entry-ports of the cylinder and allow steam to enter and act upon the piston to drive the machine in one direction. When the bell-crank lever 42 is depressed from the position shown in solid lines in Fig. 4, the lever 41 will be shifted in position so that the slide-valve 11 will be reciprocated to open and close the other port of entry into the cylinder, and steam will also be allowed to enter to reciprocate the piston in the opposite direction. Hence the lever 42 serves as a lever for starting and stopping the machine and for reversing the direction of movement of the mechanism thereof.

On each of the shafts 19, in front of the crank portion thereof, is mounted an eccentric disk 48, around which is secured a strap 49, bearing a pitman 50, which is pivotally connected at its other end to a piston 51, operating in a small cylinder 52, from which extends a pipe 53, which leads to a feed-pump 54, operated by compressed air, the air being compressed by the reciprocation of the pistons 51 in cylinders 52.

Over each of the push-bars 1 at the end of the cylinder 9 from which the push-bar is driven is mounted in supporting-links 55 a lever 56, having the lower end terminating in a dog 57 for engagement with the rack on the upper surface of the push-bar beneath it. The lever 55 forms the means whereby after the retraction of one of the push-bars to its full extent the push-bar may be forced forward sufficiently to bring the rack on the upper surface thereof into engagement with the gear 28 on the shaft 27, by means of which the push-bar is forced into one of the coke-ovens. As may be seen in Fig. 2, the cogged plates 1^a do not extend entirely to the pusher-head 5 at the end of the rack-bar, but terminate a short distance therefrom, so that when a push-bar is retracted from one of the coke-ovens it is unnecessary to stop the motion of the gear 28 at the instant that the push-bar has been retracted to the proper distance. Instead of its being necessary to stop the movement of the gear 28 the retraction of the push-bar causes the disengagement of the gear with the rack on the upper surface of the push-bar, and consequently renders the gear 28 no longer operative upon the push-bar to retract it further. After a push-bar has been

so far retracted that the rack on the upper surface thereof is no longer engaged by one of the gears 28 it is of course necessary to shift the push-bar outward sufficiently to bring the rack on its upper surface into engagement with one of the gears 28, so that the push-bar may be forced outward from the frame to discharge the coke from the oven.

It will have been observed that separate cylinders are provided for supplying power to the two push-bars and separate means for controlling the entry of steam is provided for each cylinder, so that the push-bars may be operated simultaneously or separately, as may be desired. It will also have been noted that each of the cylinders operates mechanism whereby movement may be imparted to the driving-shaft S, and consequently the operator, if there be only one, may control the movement of the machine forward along the tracks when handling the operating-lever of either cylinder. It will also have been observed that the two cylinders 9 on the crank-shafts 19 are so arranged that both cannot be on a dead-center at the same time, and consequently if at the time the machine is stopped one of the pistons is on a dead-center the machine may be set in motion from the other cylinder, and by means of the connections of the driving-shaft with the crank-shaft whose piston has been stopped on a dead-center the crank-shaft and piston so stopped may be shifted in position to take the piston off the dead-center.

In the operation of the machine it is desirable if coke is to be pushed from the ovens in both rows to have two operators to control the action of the push-bars, one operator taking his station adjacent to the controlling-lever for each cylinder and manipulating the controlling-lever to cause the push-bar upon his side of the machine to be advanced and retracted, as occasion requires.

In order to avoid interference with each other in the control of the forward movement of the machine, the operator upon one side of the machine when two operators are handling it will throw the lever 36 so as to shift the gear 32 upon his side of the machine out of mesh with its corresponding gear 31 and will leave the control of the forward movement of the machine to the other operator. It is of course presumed that the machine is operated in the manner explained, with the ovens in the two rows placed so that when the push-bar upon one side of the machine is advanced to discharge coke from an oven in one row the push-bar on the other side of the machine may be operated to discharge coke from an oven in the other row. In case the ovens in the two rows are not properly arranged to permit such action of the machine it will be necessary to discharge the coke alternately from an oven in each row and for the operator upon one side of the machine after

the discharge of the coke from an oven in the row upon which he is operating to retract the push-bar upon his side of the machine and throw the gear 32 out of mesh with gear 31 on his side of the machine, so that the operator upon the other side may control the advance of the machine to bring the pusher-rod upon his side into position for operation upon an oven in the row on his side.

10 While I have described and illustrated the preferred form of embodiment of my invention, it is to be understood that various changes in the form, proportions, and exact mode of assemblage of the elements may be made without departing from the spirit of the invention or sacrificing any of its advantages.

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

20 1. In a machine for discharging coke from ovens, the combination with a supporting-frame, of a push-bar arranged for reciprocation on said frame and adapted to be projected from the side of the frame, means for projecting said push-bar normally disengaged from the push-bar, and separate means for imparting initial movement to the push-bar to bring it into engagement with said projecting means.

2. In a machine for discharging coke from 30 ovens, the combination with a supporting-frame, of a push-bar slidably mounted on the frame and adapted to be projected at one side thereof, means on said frame for advancing and retracting said push-bar, said means be-

ing disengaged from said bar when the bar is retracted, and means for imparting initial projecting movement to the push-bar. 35

3. In a machine for discharging coke from ovens, the combination of a frame, a push-bar mounted for reciprocation on said frame and 40 having a rack formed thereon, said rack terminating at a slight distance from the head of the push-bar, a gear adapted to engage said rack when the push-bar is advanced slightly, means for imparting movement to said gear, 45 and separate means for advancing said push-bar sufficiently to bring the rack thereon into engagement with said gear.

4. In a machine for discharging coke from ovens, a frame, a push-bar mounted for re- 50 ciprocation on said frame and having a rack thereon terminating a slight distance from the head of the push-bar, a gear adapted to engage said rack when the push-bar is slightly advanced, a motor for imparting movement 55 to said gear, and a pivoted lever having a dog adapted to engage the rack on the push-bar, whereby said push-bar may be advanced sufficiently to cause the rack thereon to be engaged by said gear. 60

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOS. KERSHGENS.

Witnesses:

JOS. KERSCHGENS, Jr.,
ED. ARMSTRONG.