

H. B. MEECH.
FURNACE FOR ROASTING ORES.

(Application filed Oct. 11, 1899.)

(No Model.)

3 Sheets—Sheet 1.

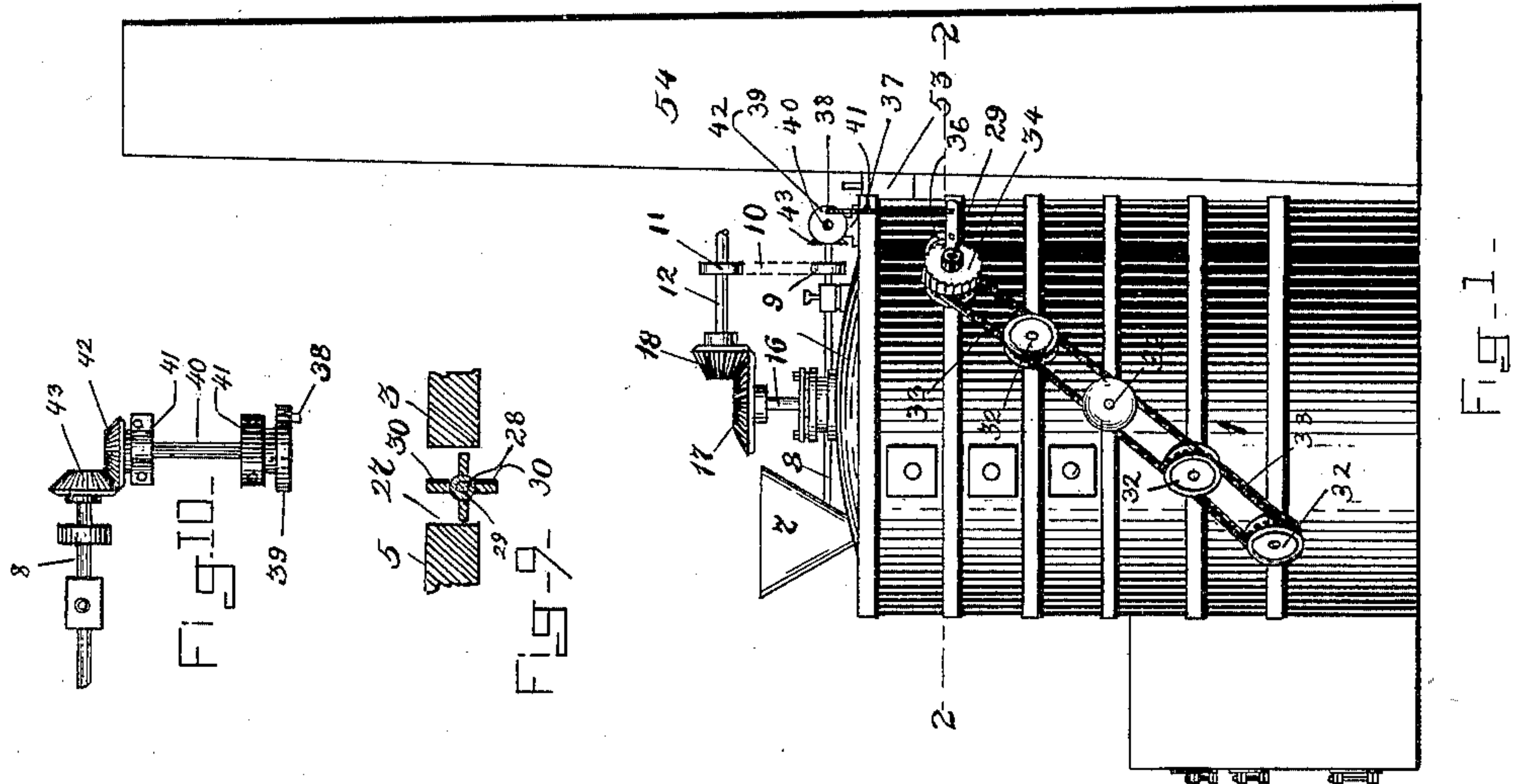


Fig. 1—

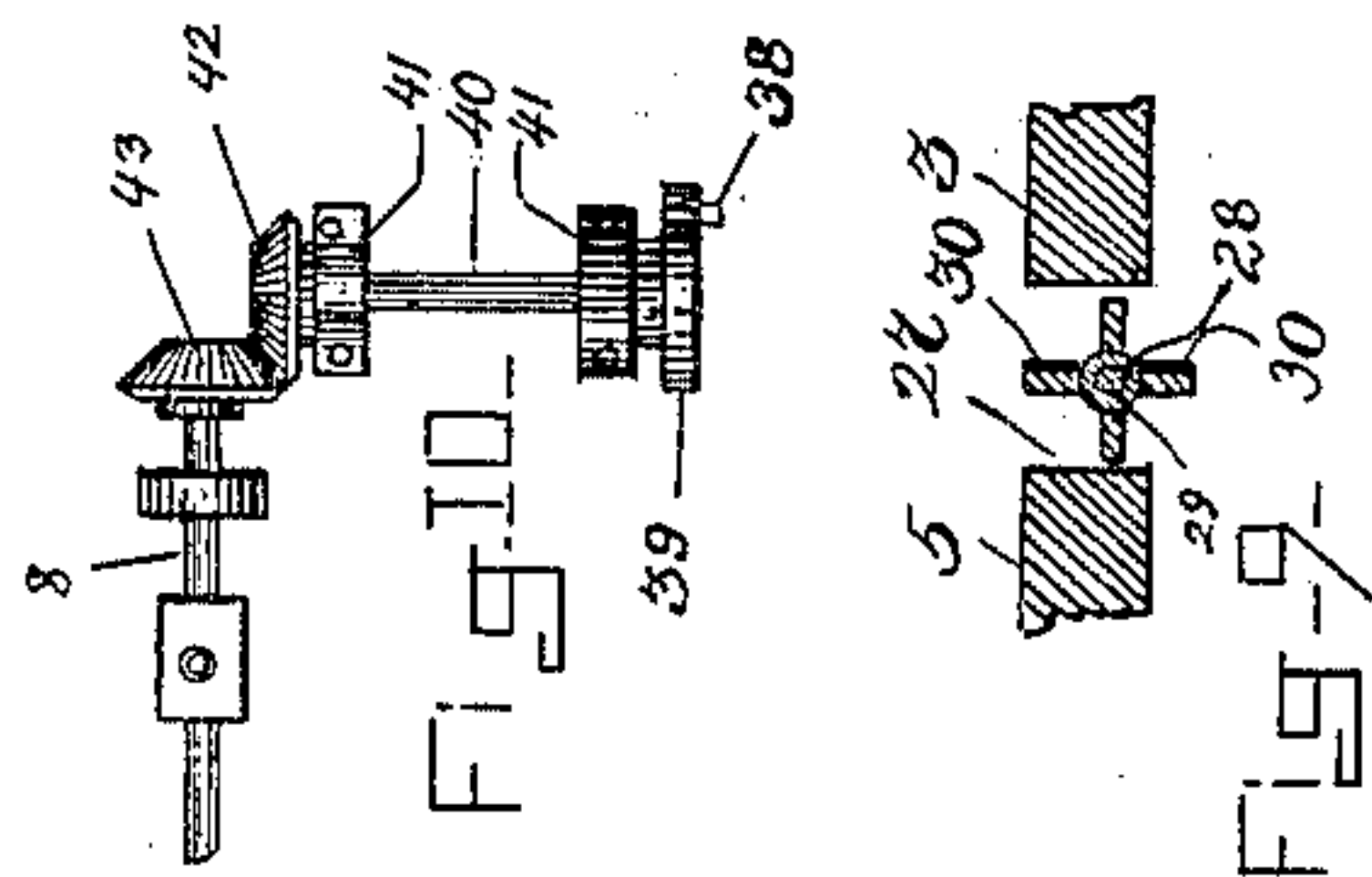


Fig. 9—

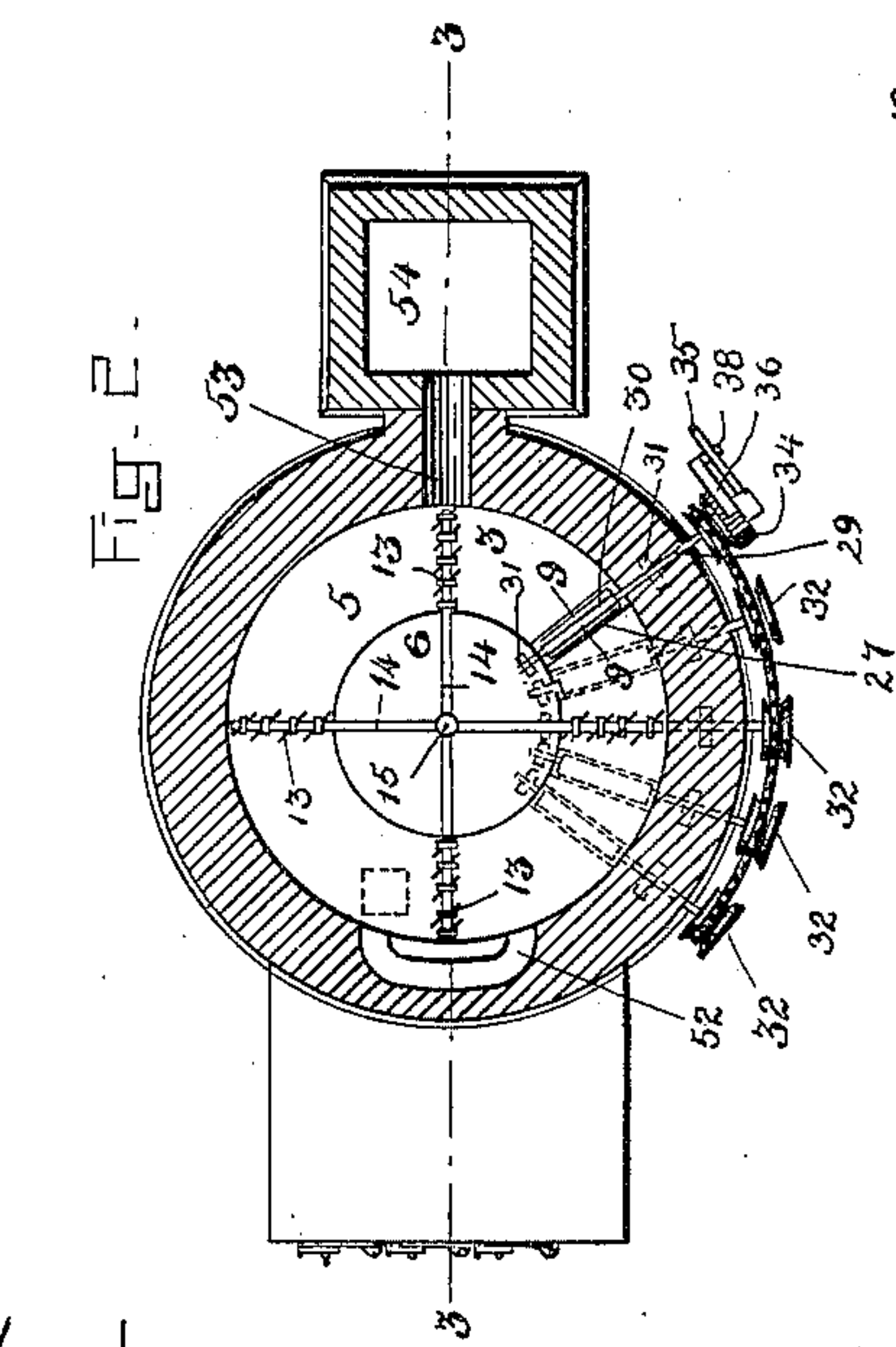


Fig. 2—

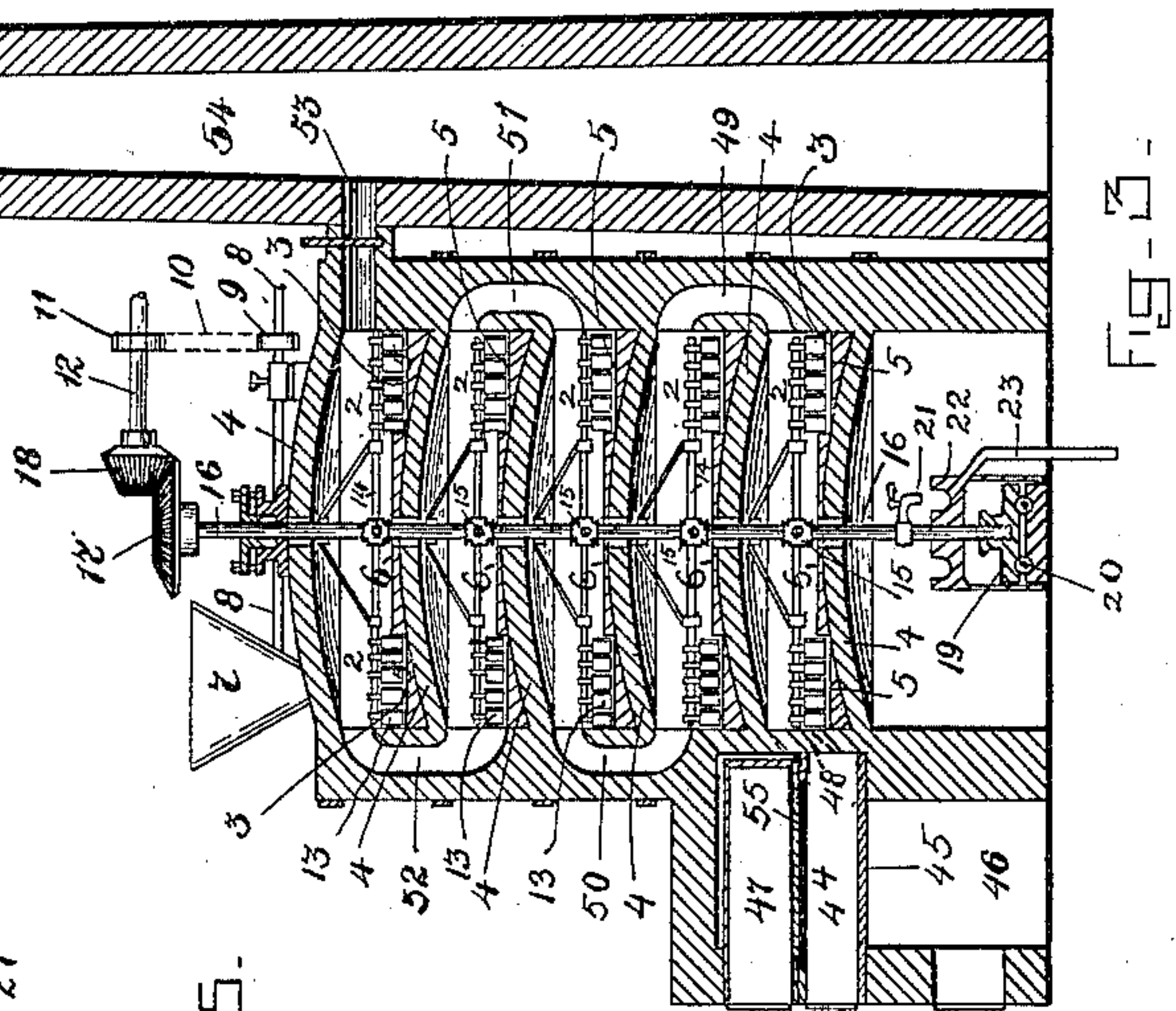


Fig. 3—

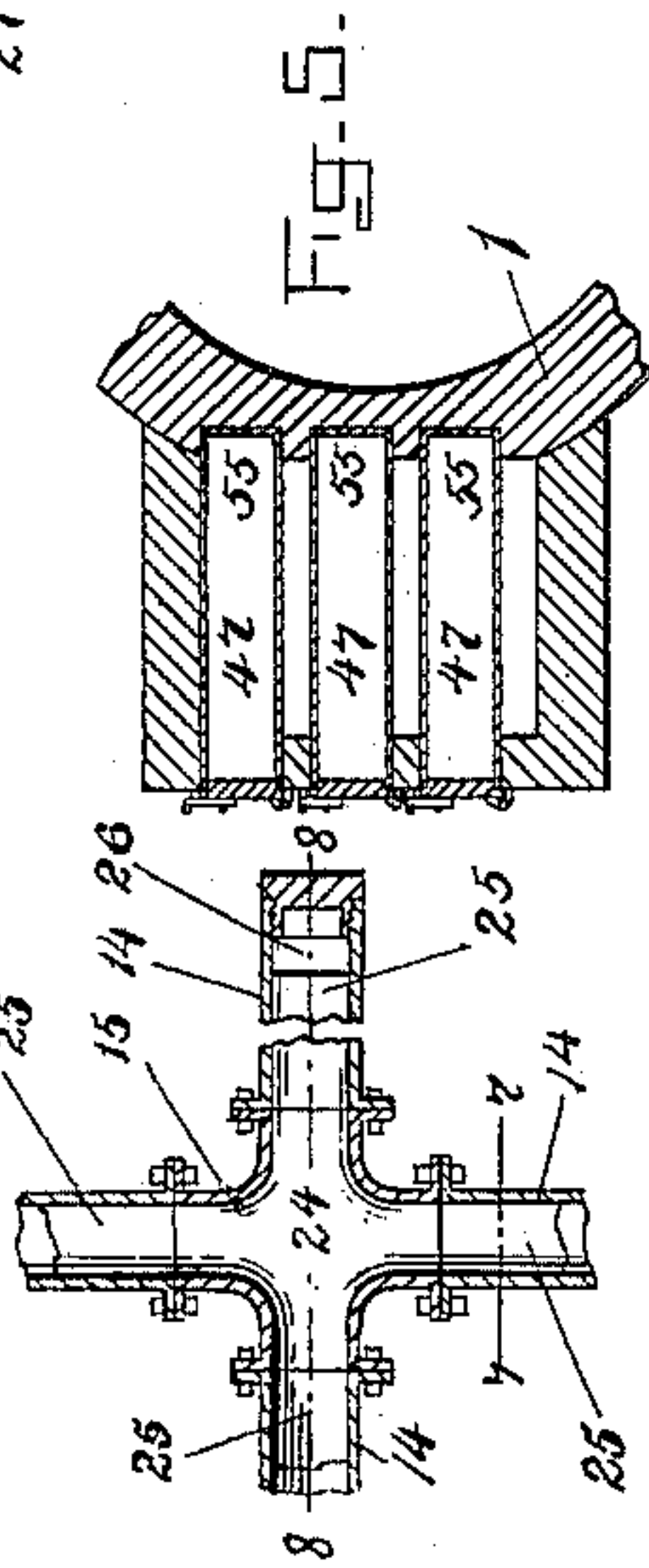


Fig. 5—

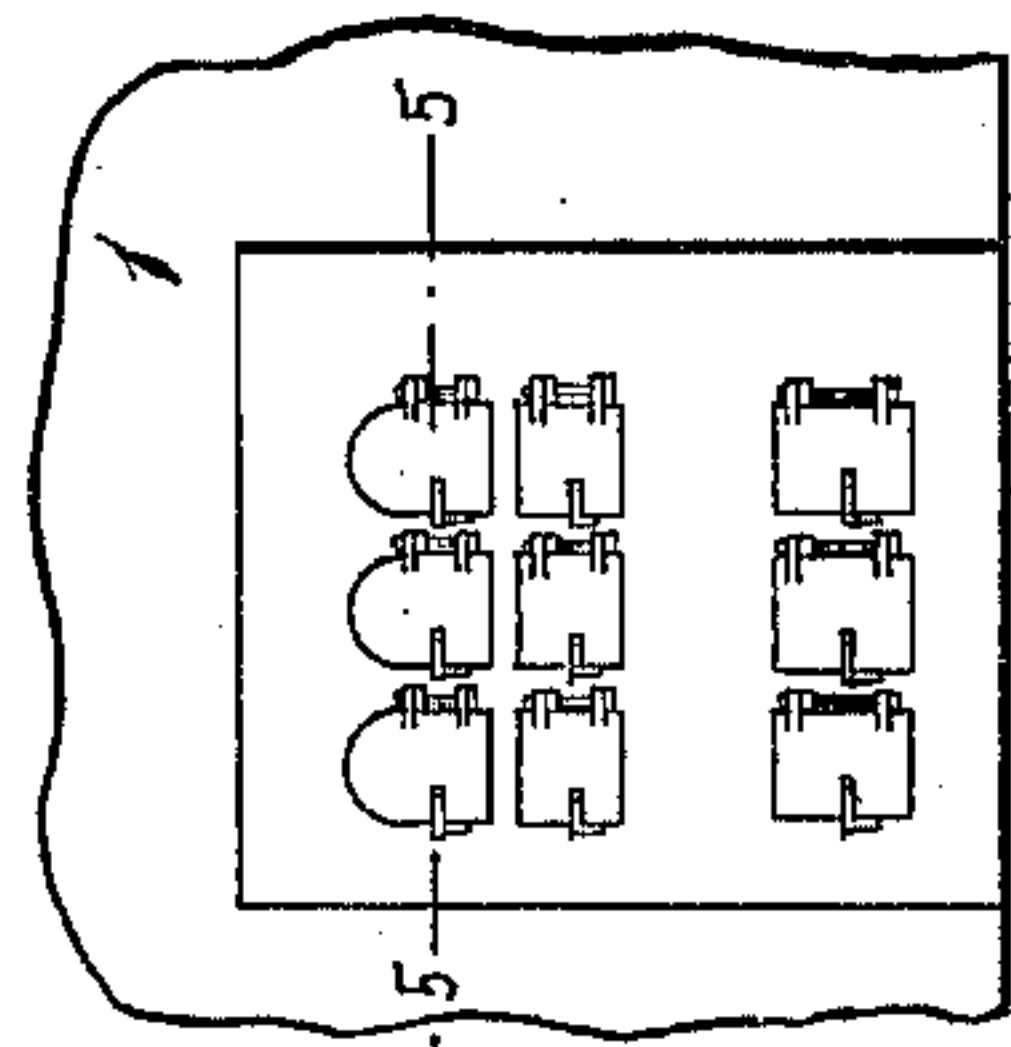


Fig. 4—

WITNESSES.
Henry March.
Sydney E. Tapp.

Fig. 6—

Fig. 7—

INVENTOR -
Harrison B. Meech.
by his Attorney
Charles S. Gooding.

No. 652,193.

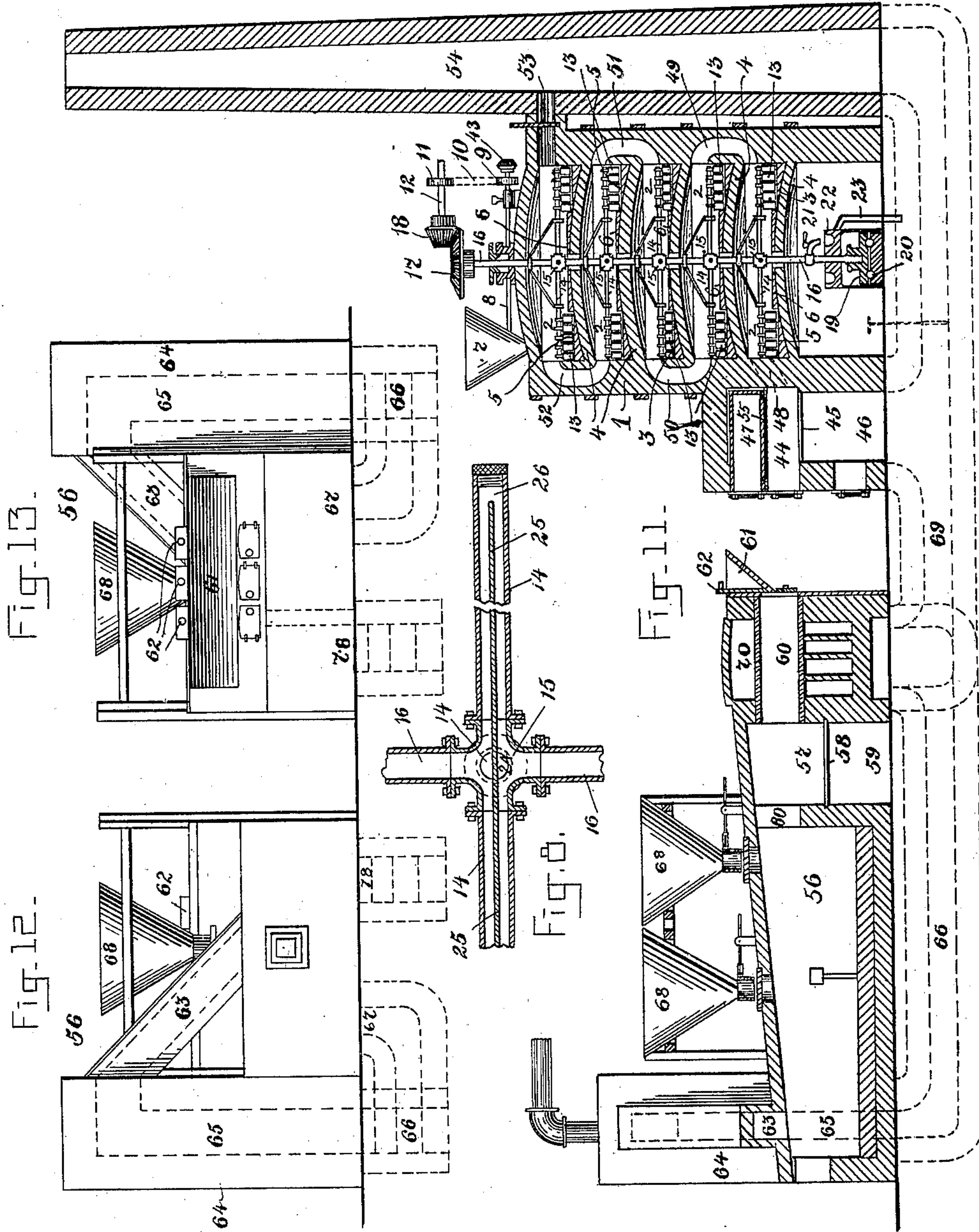
Patented June 19, 1900.

H. B. MEECH.
FURNACE FOR ROASTING ORES.

(Application filed Oct. 11, 1899.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES.

R. Henry Marsh.
Sydney E. Tapp.

INVENTOR.

Harrison B. Meech,
by his Attorney,
Charles J. Gooding

No. 652,193.

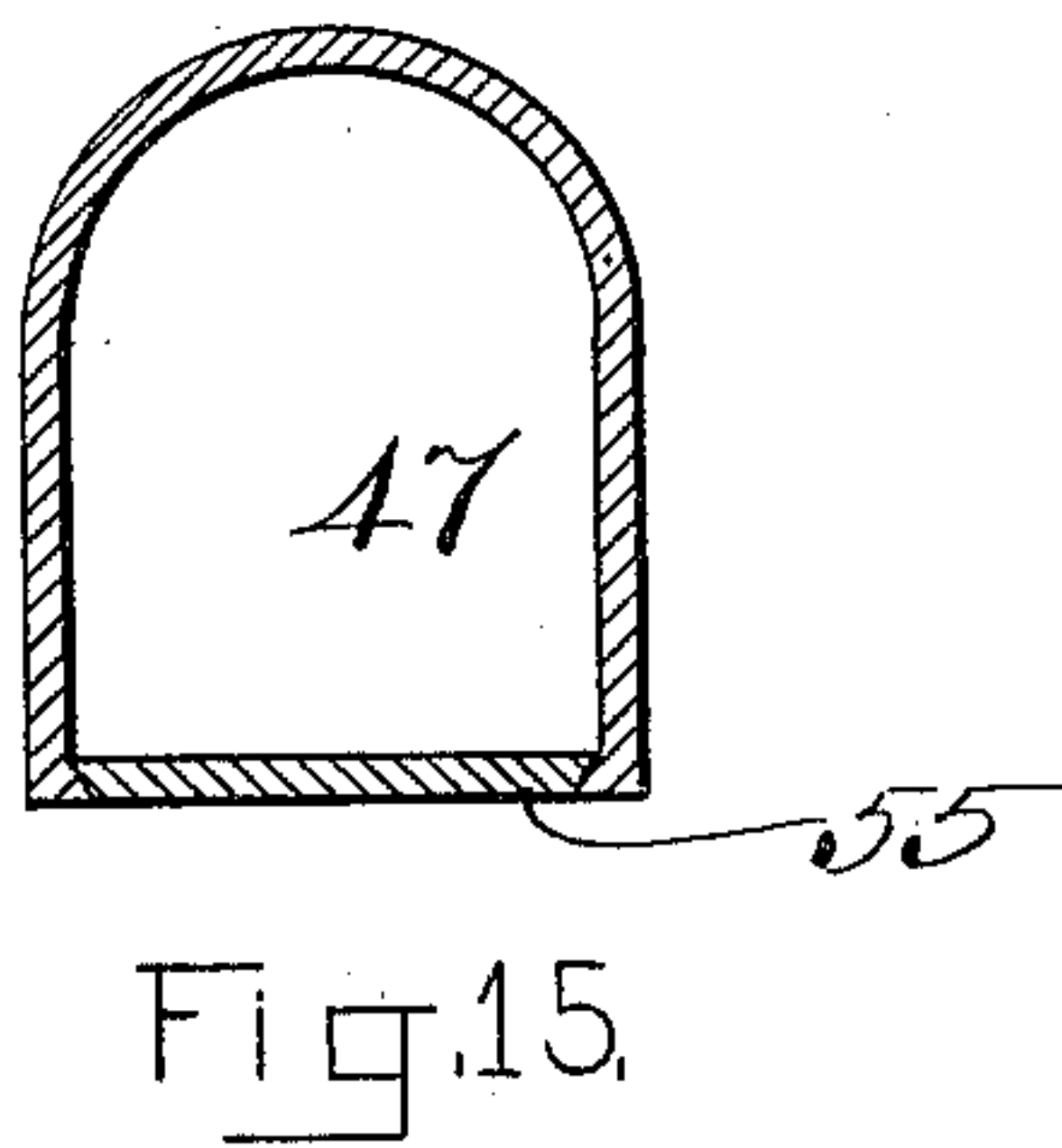
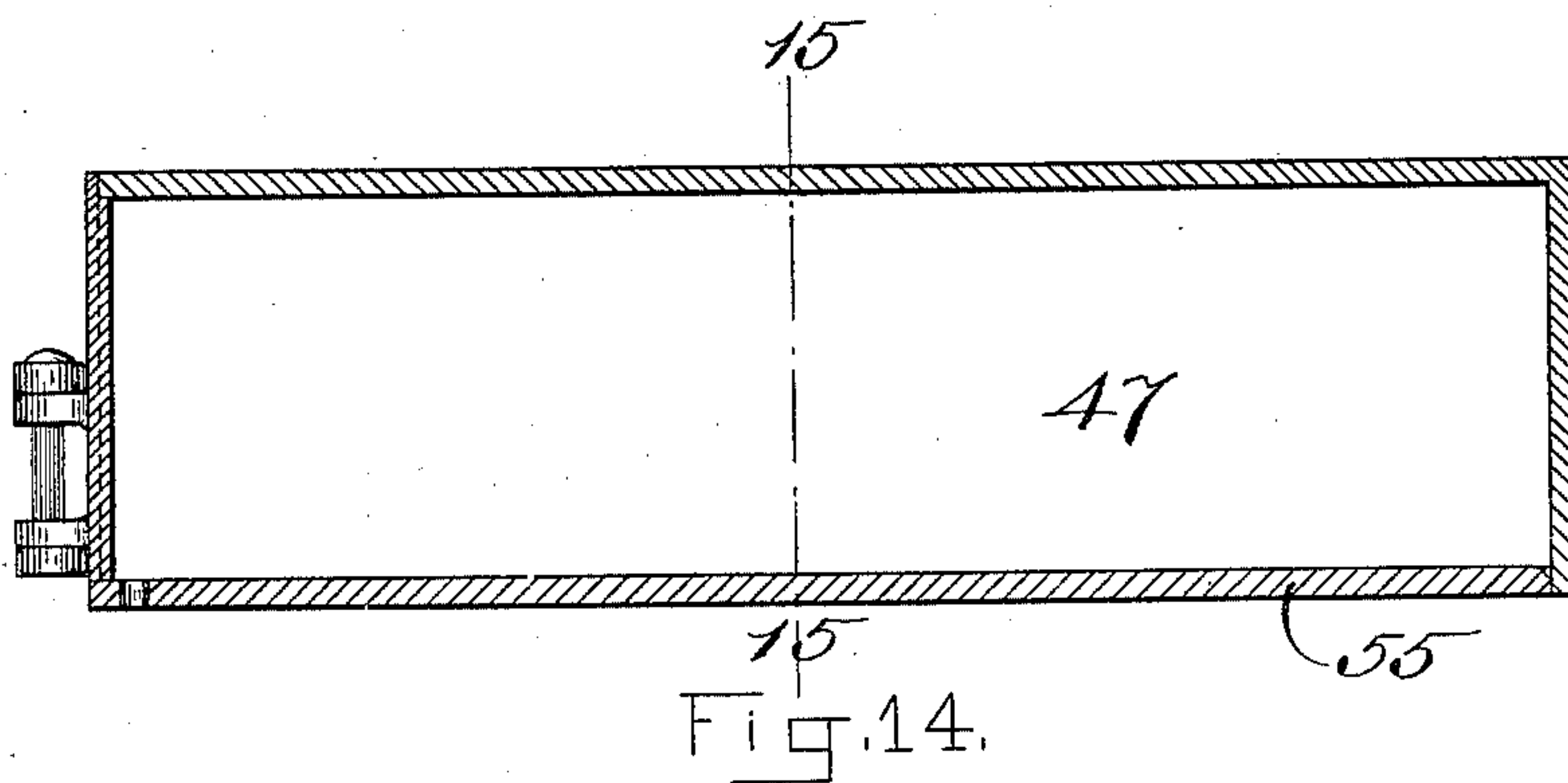
Patented June 19, 1900.

H. B. MEECH.
FURNACE FOR ROASTING ORES.

(Application filed Oct. 11, 1899.)

(No Model.)

3 Sheets—Sheet 3.



WITNESSES
J. Henry Marsh.
Sydney E. Taft.

INVENTOR
Harrison B. Meech
by his Attorney.
Charles S. Gooding.

UNITED STATES PATENT OFFICE.

HARRISON B. MEECH, OF DENVER, COLORADO.

FURNACE FOR ROASTING ORES.

SPECIFICATION forming part of Letters Patent No. 652,193, dated June 19, 1900.

Application filed October 11, 1899. Serial No. 733,291. (No model.)

To all whom it may concern:

Be it known that I, HARRISON B. MEECH, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented new and useful Improvements in Furnaces for Roasting Ores, of which the following is a specification.

The object of my invention is to produce an economical, compact, and easily-operated furnace for roasting ores.

The invention consists in a roasting-furnace having a number of ovens, one above the other, and mechanism for automatically feeding said ore from one oven to another from the top to the bottom of said furnace.

The invention further consists in the combination, with a roasting-furnace, of a reverberatory furnace so constructed and arranged that the heated gases from the reverberatory furnace shall pass through the roasting-furnace and assist in roasting the ores in said roasting-furnace.

The invention further consists in certain improved construction and arrangement of parts set forth in the following specification, and particularly pointed out in the claims thereof.

Referring to the drawings, Figure 1 is a side elevation of my improved roasting-furnace. Fig. 2 is a horizontal section, line 2 2, Fig. 1. Fig. 3 is a vertical section, line 3 3, Fig. 2. Fig. 4 is a side elevation of the retort and furnace doors and a portion of the furnace broken away to save space in the drawings, said elevation being from the left of Fig. 1. Fig. 5 is a detail horizontal section, line 5 5, Fig. 4, through the retorts. Fig. 6 is an enlarged horizontal section through a portion of one series of shovel-carrying arms. Fig. 7 is a transverse section, line 7 7, Fig. 6. Fig. 8 is a vertical section, line 8 8, Fig. 6. Fig. 9 is an enlarged detail transverse section through one of the feed-wheels, line 9 9, Fig. 2. Fig. 10 is a plan detail of a portion of the wheel-actuating mechanism. Fig. 11 is a longitudinal section of a roasting-furnace similar to that shown in Fig. 3 in combination with a reverberatory smelting-furnace. Fig. 12 is an end elevation of the reverberatory fur-

nace viewed from the left of Fig. 11. Fig. 13 is an end elevation of the reverberatory furnace viewed from the right of Fig. 11. Fig. 14 is a vertical longitudinal section of one of the retorts 47 in the roasting-furnace. Fig. 15 is a transverse section through one of the retorts 47, taken on line 15 15, Fig. 14.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 1 is a cylindrical roasting-furnace having a series of ovens 2 2 2, one above the other. The beds 3 3 of said ovens are built upon arches 4 4 and are stepped—that is, the portion of the oven-bottom 5, where the ore is placed near the periphery, is lower than the portion 6 near the center thereof.

The ore is placed in the hopper 7 and fed into the top oven 2 by a rotary feed-wheel, which is rotated by a shaft 8, rotated by a pulley 9, fast to said shaft and rotated by a belt 10 (dotted) and pulley 11, fast to the main driving-shaft 12. The ore after passing into the oven 2, through the hopper 7, at the point indicated in dotted lines, Fig. 2, is carried around by shovels 13, fast to hollow arms 14, said arms being fast to a center piece 15, said center piece 15 joining together two sections of the hollow vertical shaft 16. Said shaft 16 is rotated by a bevel-gear 17, which meshes a bevel-gear 18, fast to the main driving-shaft 12. The lower end of the shaft 16 has a flange 19 fast thereto and turns upon a ball-bearing 20. A drip-cock 21 upon the shaft 16 allows water introduced at the top of said shaft to pass out into a stationary trough or basin 22, whence it is carried by a pipe 23 to any desired location. The flanged center pieces 15 have a horizontal partition 24 therein, Fig. 8, which joins a horizontal partition 25 in each of the hollow arms 14. Said partition extends nearly to the outer ends of the arms 14, where an opening 26 connects the upper and lower chambers formed by the partition 25 in said arms. It will thus be seen that water introduced into the hollow vertical shaft 16 at the top thereof will pass downwardly until it strikes the horizontal partition 24 in the top center piece 15, where it will diverge outwardly in the upper cham-

ber of each of the four hollow arms 14 in the upper oven 2 until it reaches the outer end of said arms, when it will pass down through the openings 26 to the lower side of the horizontal partitions 25, thence returning to the center piece 15 and down through the next section of the vertical shaft 16 to the next center piece below, when the operation will be repeated, and so on until the water reaches the drip-cock 21, when it will pass out, as hereinbefore described.

With the exception of the drip-cock the vertical shaft 16, center pieces 15, and arms 14, &c., are essentially the same as those illustrated and described in another application made by me, Serial No. 707,799, filed March 4, 1899.

The ore is carried around each oven by the shovels until it reaches an opening 27 in the bed thereof, when it is carried down through said opening by an intermittently-rotated wheel 28, fast to a shaft 29. Said wheel has blades 30 thereon, which close the opening 27 to the upward passage of the heated gases, but feeds the ores through said opening, when said wheel is rotated, from one oven to the next oven below.

It will be noted that there are no partitions in the ovens hereinbefore described.

Each of the shafts 29 turns in bearings 31 and projects outside the wall of the furnace 1 and has a flanged sprocket-wheel 32 thereon. All of the sprockets 32 are rotated by an endless sprocket-chain 33, which connects the said sprockets together. The upper shaft 29 has a ratchet 34 fast thereto and a pawl-lever 35 pivoted thereon. A pawl 36, pivoted to the pawl-lever 35, engages the teeth of the ratchet 34. The pawl-lever 35 is connected by a rod 37 to the crank-pin 38 upon the disk 39. The disk 39 is fast to a shaft 40, which rotates in bearings 41 41, said shaft being rotated by a bevel-gear 42, which meshes a gear 43, fast to the shaft 8. It will be seen that as the shaft 40 is rotated the rod 37 will alternately raise and lower the pawl-lever 35, turning the ratchet step by step, rotating the shaft 29 and through the sprocket-chain 33 and sprocket-wheels 32 the different shafts 29 and the wheels 28, and feeding the ore from each oven to the oven below and from the lowermost oven to a cart placed below to receive the ore.

It is evident that the different wheels may be turned by hand, if desired, instead of automatically from the shaft 8, as hereinbefore described.

To the furnace 1 is attached a fire-box 44, having grate-bars 45 therein and an ash-pit 46. The coal is placed directly upon the grate-bars 45 or first placed in the retorts 47 until it is coked and then dropped onto the grate-bars 45 by withdrawing the bottom 55 of said retorts, where it burns. The heated gases pass from the fire-box 44 through the flue 48

into the lowermost oven 2, thence through the flue 49 to the second oven, thence through the flues 50, 51, 52, and 53 to the stack 54, and thence to the outer air.

In Fig. 11 I have illustrated a longitudinal section of a roasting-furnace like that hereinbefore described in combination with a reverberatory smelting-furnace, in which 56 is the main body of the reverberatory furnace, 57 the fire-box, 58 the grate-bars, 59 the ash-pit, and 60 60 the retorts into which the coal is fed from the chute 61 by lifting the slides 62, the coal passing into the retorts 60 60, where it is coked by the heated gases which pass around said retorts, as hereinafter described. The coke is pushed out of the retorts 60 onto the grate-bars 58, where it burns, the ashes resulting from said combustion dropping into the ash-pit 59 and the heated gases passing through the flue 80, over the ore in the furnace 56, through the flue 63 into the stack 64, down through the flue 65, underground along the flue 66, upward through the flue 67 into the retort-oven 70, around the retorts 60, down the flue 78, underground through the flue 69 into the fire-box 44, around the retorts 47, through the flue 48, and thence through the ovens 2 and flues 49, 50, 51, 52, and 53 to the stack 54. Crushed or fine ore is put into the hoppers 68 68 and fed into the furnace 56 from said hoppers. It will be seen that by combining the reverberatory furnace 56 with the roasting-furnace 1 the flames and hot gases from said reverberatory furnace will be utilized to roast the ores in said roasting-furnace instead of passing directly to a stack and thence to the outside air, wasting the heat contained in said gases.

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

1. A furnace for roasting ores having two or more ovens, each of said ovens having an opening in the bottom or bed thereof, and a shaft with longitudinal blades located in each of said openings, said shafts extending through the wall of said furnace, and mechanism for simultaneously rotating said shafts from the outside of said furnace, substantially as described.

2. A furnace for roasting ores, having two or more ovens, each of said ovens having an opening in the bottom or bed thereof, a shaft with longitudinal blades located in each of said openings, said shafts extending through the wall of said furnace, a sprocket-wheel fast to each of said shafts, a sprocket-chain connecting said sprocket-wheels, and means attached to one of said shafts for rotating the same.

3. A furnace for roasting ores, having two or more ovens, each of said ovens having an opening in the bottom or bed thereof, a shaft with longitudinal blades located in each of said openings, said shafts extending through

the wall of said furnace, a sprocket-wheel
fast to each of said shafts, a sprocket-chain
connecting said sprocket-wheels and a pawl-
and-ratchet mechanism connected to one of
5 said shafts, whereby all of said shafts with
longitudinal blades are simultaneously ro-
tated.

In testimony whereof I have hereunto set
my hand in presence of two subscribing wit-
nesses.

HARRISON B. MEECH.

Witnesses:

CHARLES S. GOODING,
R. HENRY MARSH.