No. 654,640.

Patented July 31, 1900.

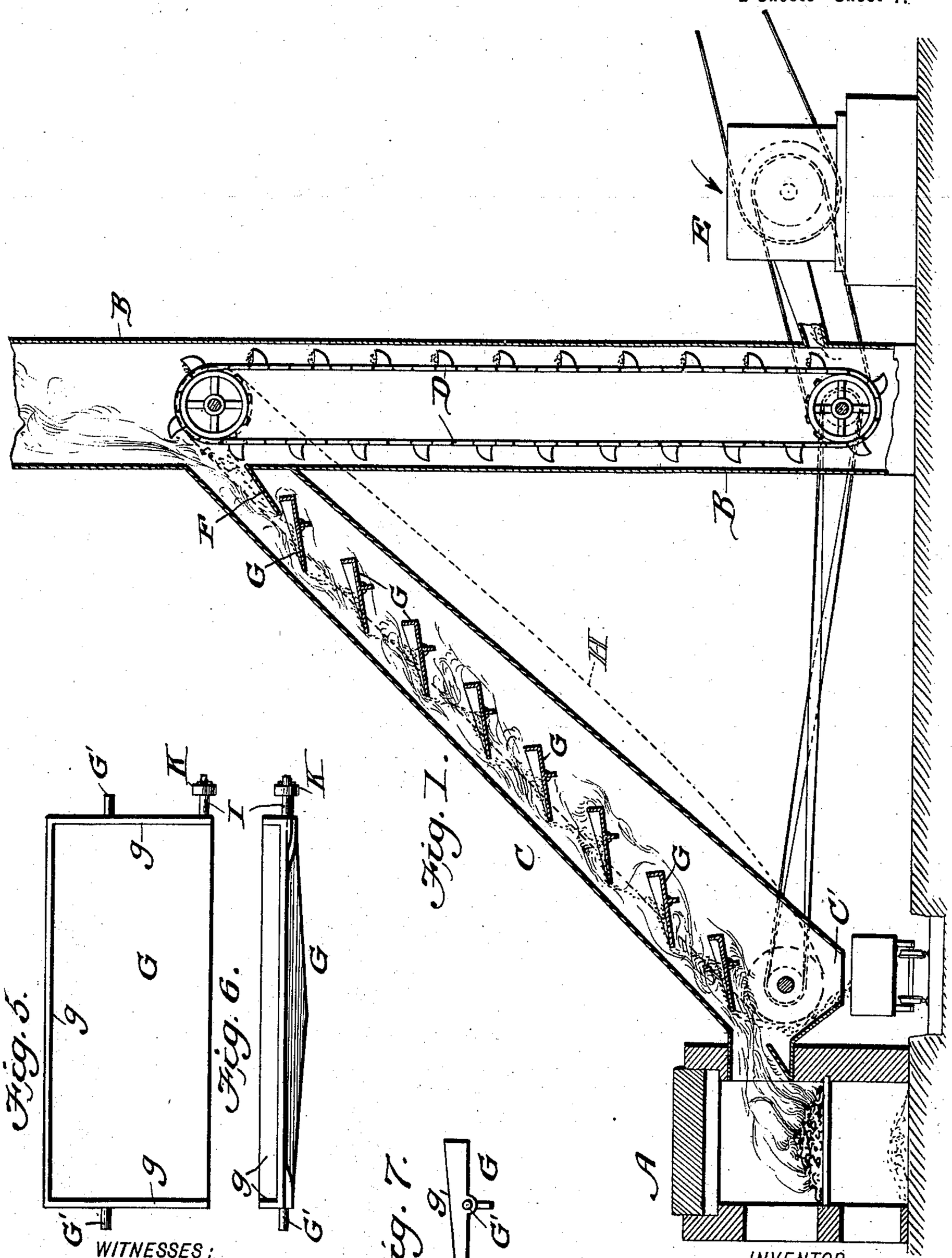
G. HUGHES.

CALCINING FURNACE.

(Application filed Nov. 15, 1899.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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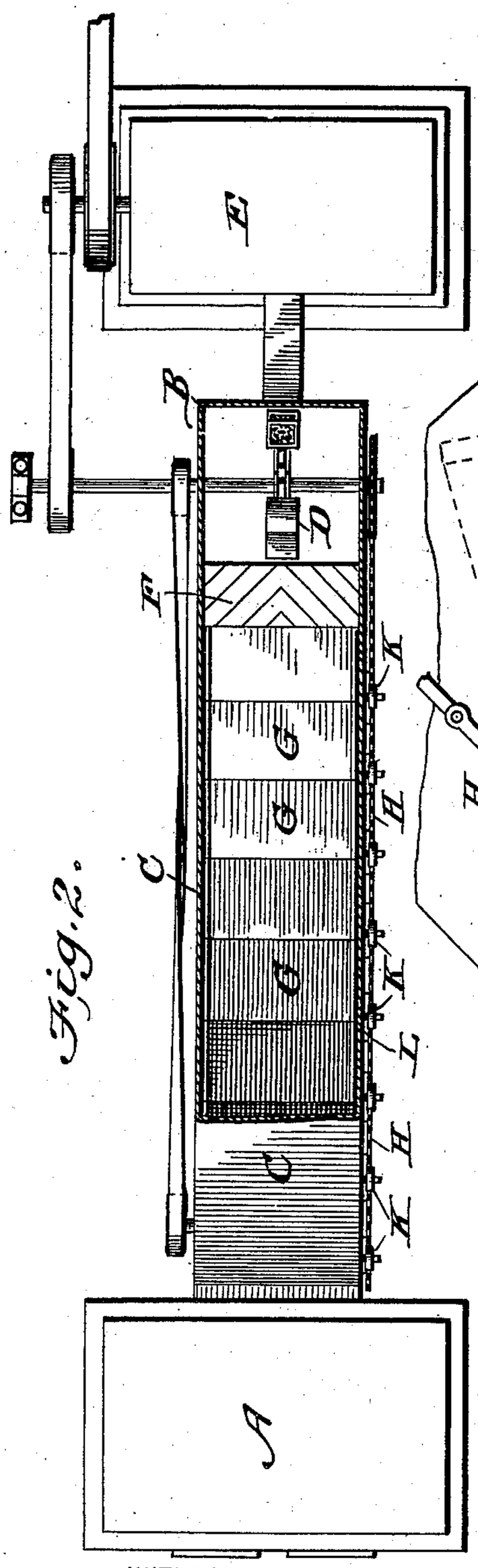

Fig. 2.

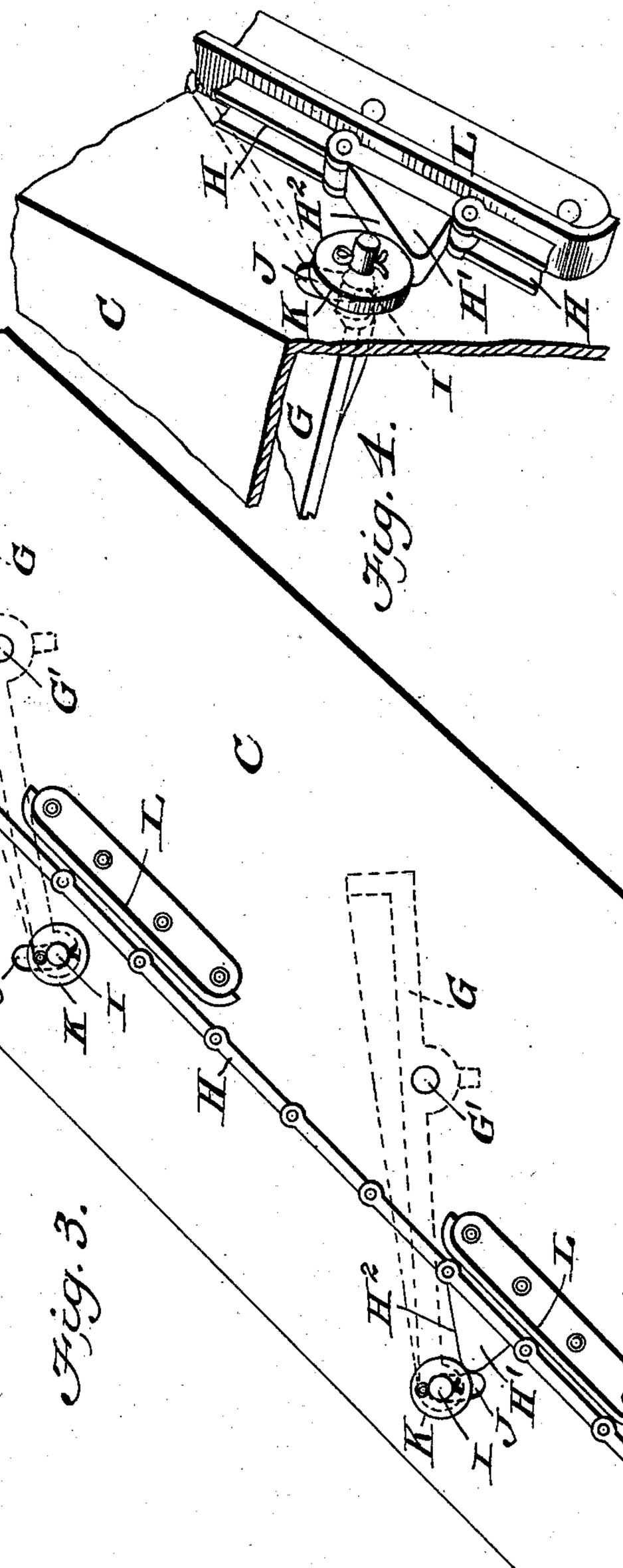

Fig. 4.

Fig. 3.

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UNITED STATES PATENT OFFICE.

GODFREY HUGHES, OF EL PASO, TEXAS, ASSIGNOR OF ONE-HALF TO JAMES ALEXANDER HALSTEAD, OF SAME PLACE.

CALCINING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 654,640, dated July 31, 1900.

Application filed November 15, 1899. Serial No. 737,114. (No model.)

To all whom it may concern:

Be it known that I, GODFREY HUGHES, residing at El Paso, in the county of El Paso and State of Texas, have made certain new and useful Improvements in Calcining-Furnaces, of which the following is a specification.

My invention is an improvement in calcine-furnaces; and it consists in certain novel constructions and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a vertical section of an apparatus embodying my invention. Fig. 2 is a top plan view thereof, a portion of the chute being broken away. Fig. 3 is a detail side view showing a portion of the chute. Fig. 4 is a detail perspective view illustrating the operating-chain and its projection for tipping the vibrating plate; and Figs. 5, 6, and 7 are respectively top plan, front edge, and side views of the vibrating plate.

In the construction as shown I employ a furnace A, a stack B, and an inclined chute C. The furnace may of itself be of any desired construction suitable for the purpose and discharges its fumes and other products into the lower end of the chute C, the upper end of such chute communicating with the stack B about in line with the upper end of the elevator D, which receives the discharge from a suitable crusher E and delivers it into the upper end of said chute. The elevator D preferably discharges onto a deflecting or spreading plate F, which is ribbed, as indicated in Fig. 2, or otherwise suitably constructed to distribute the material received from the elevator D onto the uppermost one of a series of vibrating plates G, which are supported in the chute C and being alike in construction the description of one will answer for all. The plates G are arranged in an inclined position, one slightly above the other, and retreat gradually toward the upper end of the series, the series of vibrating plates being thus inclined to correspond with the inclination of the chute C, as shown in Fig. 1.

As shown in Figs. 1 and 3, the vibrating plates G are pivoted between their front and rear edges at G′, such pivot being preferably so arranged that the front edge of the plate where it discharges overbalances the portion of the plate in rear of the pivot G′, so the discharge edge of the plate G will drop by gravity from the position indicated near the bottom of Fig. 3 to that indicated near the top of said figure when the projection on the operating-chain H has passed out of engagement with the vibrating plate. The plate G is provided at *g* with flanges which prevent the material from passing off the sides or rear edge of the plate G, the front edge of such plate being unobstructed, so the material can freely pass or discharge from each plate to the next lower one, the discharge edge of each plate lying vertically above the next lower plate and preferably over a point slightly in rear of the pivot G′ of the said lower plate, as will be understood from Figs. 1 and 3.

Stop-pins I are provided and extend laterally from the plate G, at or near its discharge end, such pin projecting through slots J in the chute and one of the pins being provided with a roller K, which forms a bearing for the projection H′ on the chain H, as will be understood from Fig. 4. Chain H is suitably supported and driven by gearing with other moving parts of the apparatus and has the projections H′ suitably spaced apart to secure the desired operation of the vibrating plates. To insure the proper operation of the plates by the projections on the chain, I provide supporting-guides L, which may be carried by the chute or otherwise suitably supported and are arranged opposite the bearings K in such a manner as to support the chain while its projections H′ are in operative contact with said bearings, thus avoiding any sagging of the chain at such time and insuring the proper operation of the vibrating plates by the movement of the chain, as will be understood from the drawings.

The chute C has a discharge at C′, through which the roasted ore may be discharged into a car or other suitable receptacle placed to receive it, as is best shown in Fig. 1 of the drawings.

In the operation of the apparatus the ore from the crusher is taken from the elevator-buckets and delivered onto the deflecting-plate F, which distributes it upon the uppermost one of the vibrating plates in a thin

layer. The ore is here first subjected to a low dull dark-red heat, as it is some distance from the furnace. The ore is then discharged step by step from one vibrating plate to the next lower one until it is discharged at the bottom of the chute. The plates G are so arranged as to secure a uniform and perfect roasting of the ore. Thus if the ores are found to roast too fast the number of tripping projections or dumping-links H′ in the chain H may be increased, thereby hastening the transit of the ore from the top tipping-plate to the bottom and thence to the car. On the other hand, if the ore roasts slowly the number of dumping-links can be reduced until the transit of the ores can be slowed down sufficiently to secure the perfect roasting.

In the operation described since the ore travels by gravity alone the roasted material, being lighter, will find its way to the top of the plate and will pass quickly to the bottom of the chute, the heavier substance naturally remaining on the bottom of the plate until the effect of the heat and the agitation of the plate by the dumping-links deposit it successively from the top plate to the hopper below, when it will be thoroughly roasted.

The projections or dumping-links H′ are inclined on their upper faces at H^2, so they gradually lift the discharge edge of the plates G and then drop them abruptly, giving a jarring vibration to said plates, which tends to cause them to discharge onto the plates below. In this connection it will be noticed the plates G normally incline toward their lower or discharge edges, this being best shown in Fig. 1.

By my invention I feed the material to be roasted by gravity alone and avoid the necessity of any perishable mechanism inside the chute, where it would readily deteriorate by reason of the heat. I am also able to regulate the speed of travel of the ores by the arrangement of the dumping-links and can control the heat by the furnace doors and dampers. The arrangement of the plates G is such that the heat is admitted to all parts of the ore during the entire transit of same through the chute, thus insuring the rapid and economical handling of the ore and the perfect roasting of same.

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

1. In an apparatus substantially as described the combination of the chute having slots J, the dumping-plates pivoted and provided with stop projections extending through said slots, bearing-rollers K, and the chain having tripping projections engaging said bearing-rollers substantially as set forth.

2. A roasting apparatus substantially as described comprising the dumping-plates pivoted whereby they can drop at their discharge ends, a stop to limit the dropping movements of such ends, and means for lifting such ends of the plates and releasing them whereby they will drop and the jar resulting from the stopping of the plates will cause the roasted material to discharge.

3. In an apparatus substantially as described, the combination of the inclined series of dumping-plates arranged each to discharge to the next lower one, the chain having projections by which to engage bearings on said plates, and guides arranged opposite the bearings of the plates and adapted to support the chain while its tripping projections are in engagement with said bearings.

4. A roasting apparatus for roasting ore comprising the inclined series of dumping-plates pivotally supported whereby their discharge edges may be lifted and dropped, a stop to limit the dropping movement of the dumping-plates, and the chain provided with projections arranged to engage the plates and lift and release the discharge edges thereof whereby they will drop upon their stops and cause the roasted material to discharge substantially as set forth.

GODFREY HUGHES.

Witnesses:
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JOS. N. SWEENEY.