

(No Model.)

J. F. GUBBINS.

APPARATUS FOR DRYING AND PULVERIZING OFFAL, &c.

No. 255,852.

Patented Apr. 4, 1882.

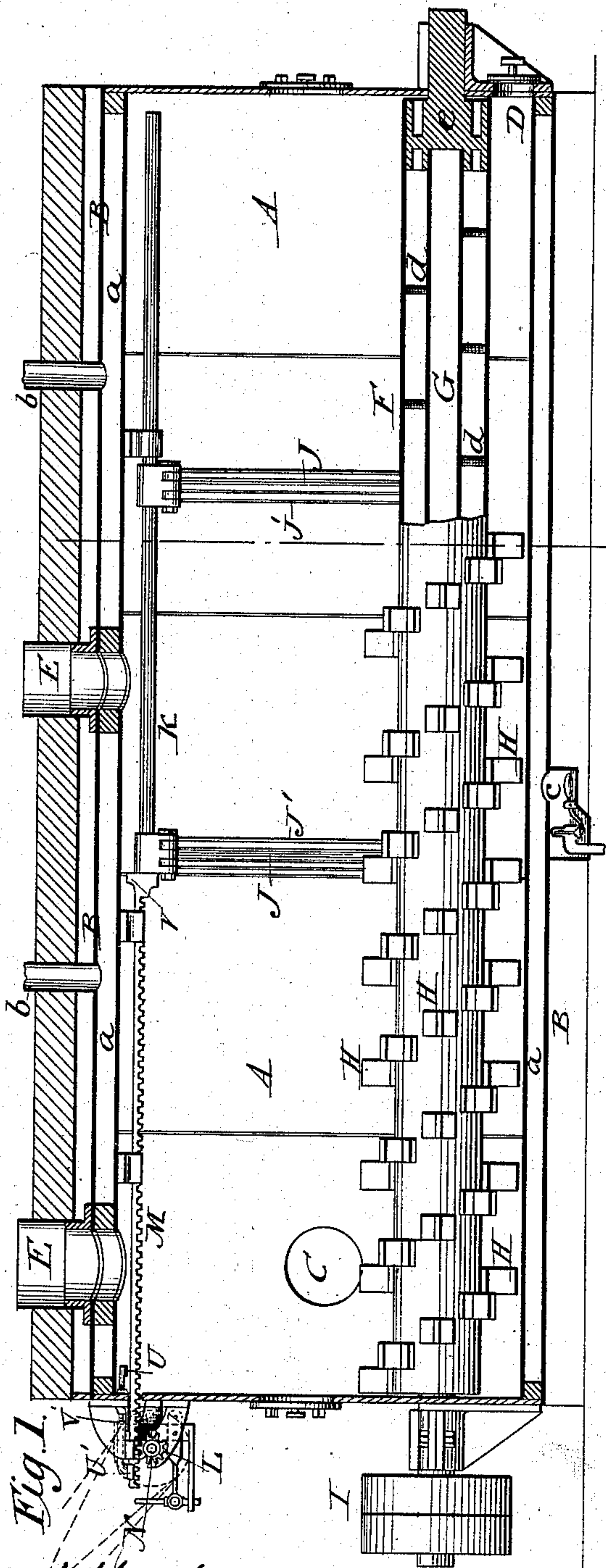


Fig. 1.

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Sidney P. Hollingworth.  
Walter J. Dodge.

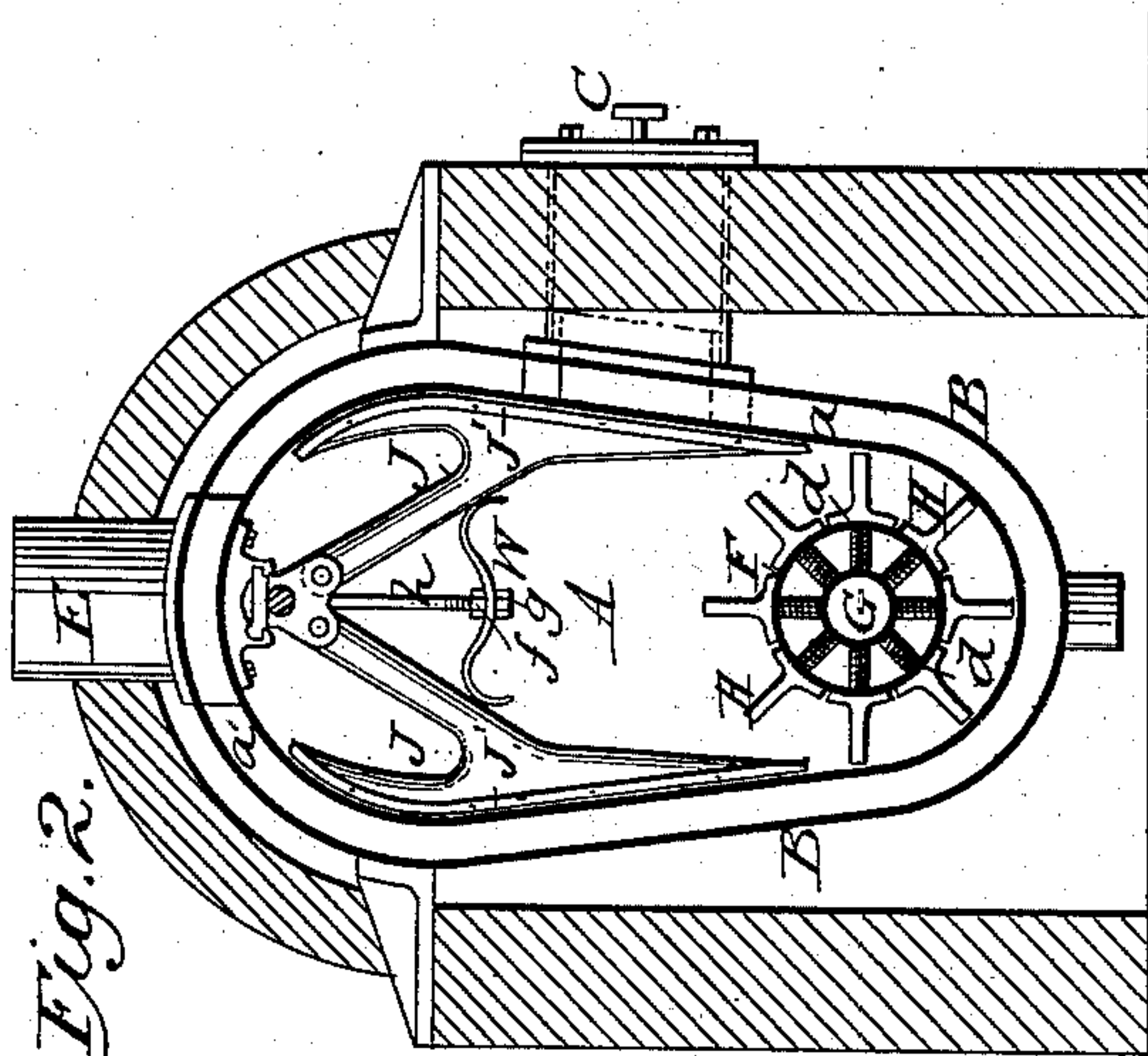


Fig. 2.

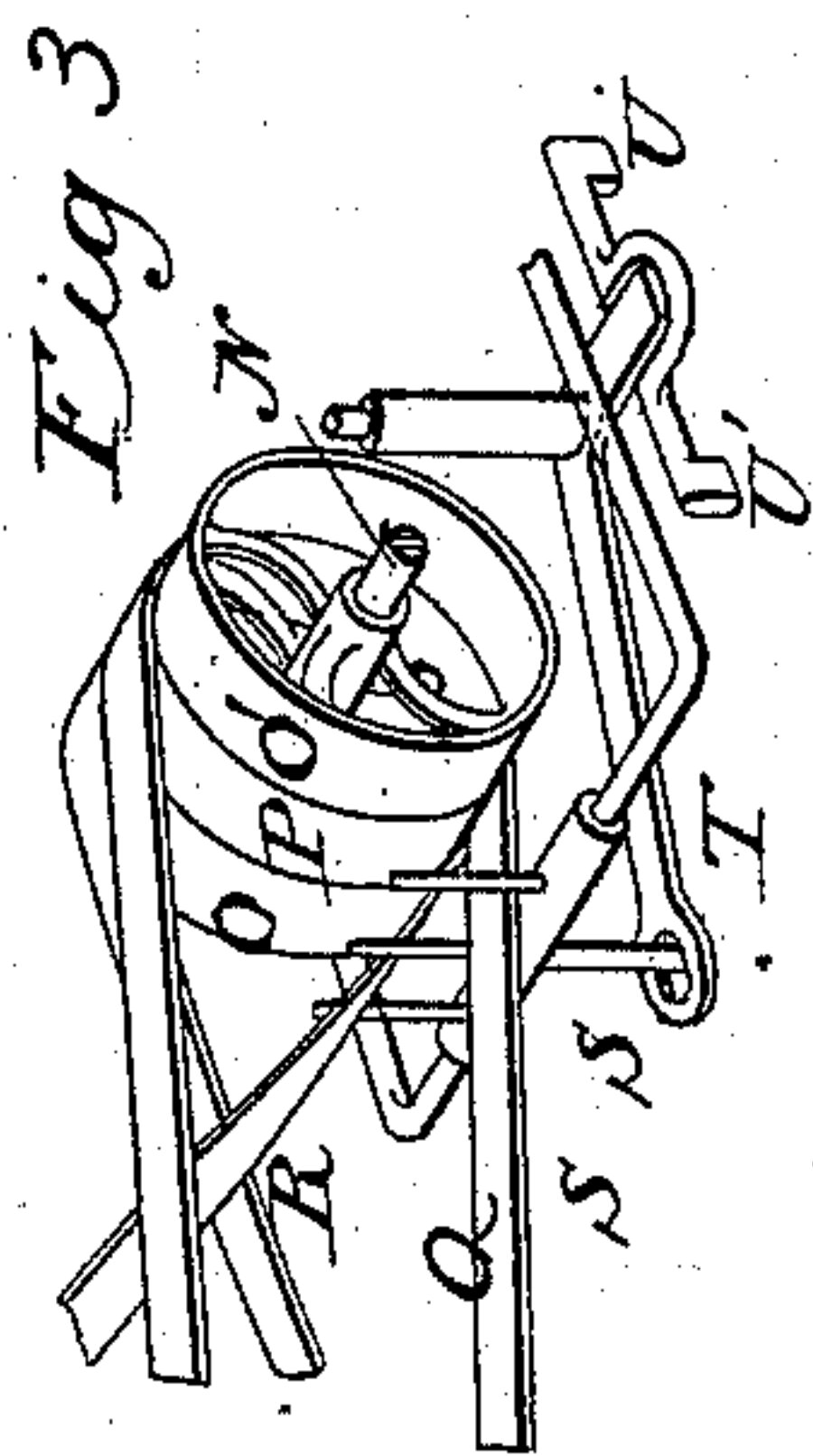


Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR DRYING AND PULVERIZING OFFAL, &c.

SPECIFICATION forming part of Letters Patent No. 255,852, dated April 4, 1882.

Application filed January 30, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN F. GUBBINS, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Apparatus for Drying and Pulverizing Offal, &c., of which the following is a specification.

My invention relates to an apparatus for drying and pulverizing refuse animal and vegetable matters of all kinds; and it consists in a vessel or chamber of oval cross-section, steam-jacketed, and furnished in its lower and smaller portion with a shaft composed of two concentric pipes or tubes suitably trussed or braced, and provided with beating, mixing, and pulverizing arms or blades; in a traveling scraper arranged to travel back and forth within the vessel and to remove adhering matter from its walls, and various features and details of construction hereinafter set forth.

In the accompanying drawings, Figure 1 represents a longitudinal vertical section of my improved apparatus; Fig. 2, a transverse vertical section of the same, and Fig. 3 an enlarged view of the reversing-gear of the scraper.

The object of my invention is to expedite the operations of drying and pulverizing offal and refuse matters of all kinds for fertilizing purposes, and to render the process of treatment continuous. With this object in view I provide an apparatus adapted to continuously receive material for treatment at one point and to discharge the finished matter at another point, the containing vessel or chamber being of egg shape vertically, highly heated by an enveloping body of steam or hot air, and furnished with a rapidly-rotating shaft carrying arms or blades which serve to separate and throw the matter upward into the enlarged portion of the vessel, where the particles, being perfectly separated, are effectively operated upon and dried by the hot air preparatory to being pulverized by the arms or blades.

Hitherto it has been customary to employ in machinery of this kind either a solid shaft or a hollow shaft consisting of a single pipe; but in practice I find it impracticable to rotate the shafts so made at a sufficiently high speed to successfully carry out the plan of treatment

herein set forth, owing principally to the springing of the shaft. Owing to the small diameter of such shafts as heretofore used, it has been necessary also to employ arms or blades of considerable length, and these are often found in actual use to break, thus rendering it necessary to stop the apparatus until the damage is repaired, or causing the work to be indifferently performed. By my construction I produce an exceedingly stiff or rigid shaft of light weight and large diameter, requiring, in consequence of the last-named characteristic, but short arms or blades to extend within proper distance of the walls of the chamber. By this plan I have been enabled in actual operation to drive the shaft at a speed of from one hundred and fifty to two hundred revolutions per minute without the least springing, whereas under ordinary constructions the speed has not averaged above twenty revolutions per minute.

Referring now to the drawings, the construction and operation of the apparatus will be more fully pointed out.

A represents the containing chamber or vessel, which, as shown in Fig. 2, is of an oval or egg shape in cross-section, with the larger end of the oval uppermost.

B indicates a jacketing or outer casing enveloping the vessel A, and separated therefrom sufficiently to produce an intermediate steam or hot-air space, *a*, to receive the steam or hot air by which the chamber A is heated. The steam-space *a* is provided with one or more inlets, *b*, and an outlet or outlets, *c*, the latter preferably furnished with steam-traps to permit the escape of the water of condensation without loss of steam.

The chamber A is supplied with matter to be treated through an opening near one end, provided with a door or lid, C, and is further provided with a discharge-opening, D, and with one or more outlet-pipes, E, through which the vapors and odors escape, being preferably withdrawn by a fan or equivalent means. In its lower and more contracted portion the chamber is provided with a longitudinal shaft composed of two concentric pipes, F G, suitably trussed and stiffened by intermediate



braces *d*, as shown, or in any well-known and approved manner of trussing.

Solid end pieces, *e*, serve both to retain or assist in retaining the pipes in proper relative position and to form the journals or bearing portions of the shaft, as shown. If desired, more than two pipes may be thus arranged and combined to form a shaft, though ordinarily two will be sufficient.

The exterior of the shaft is armed with short agitating teeth or blades *H*, having sharp corners and faces of considerable width, and preferably formed of chilled cast-iron, or pointed with tempered steel, in order to resist wear and to act efficiently in reducing the larger and more solid matters introduced into the chamber *A*.

The arms or blades *H* are arranged spirally about the shaft *F*, so that as the shaft rotates the material will be gradually moved along toward the discharge-opening *D*, and the machine thus made to deliver continuously and automatically the prepared material, which in its crude shape is fed continuously or at short intervals through the supply-opening at the head of the machine.

The shaft *F* is rapidly rotated by a belt passing about a pulley, *I*, at one end, and when thus put in motion throws the contents of the cylinder upward into the enlarged and clear space above the shaft, scattering and separating its particles and exposing them separately to the full action of the heat. As the matter falls through the heated chamber it is collected at the bottom thereof and again thrown upward, until in the course of its travel through the machine it becomes thoroughly dry and is pulverized by the arms *H*, and finally passes from the machine ready for use.

The length of the containing-chamber will vary considerably, and will depend somewhat upon the material to be treated, but will commonly be from thirty to sixty feet and upward.

In order to prevent the matter thrown upward from adhering to the walls of the chamber, I provide traveling scrapers *J*, shaped to conform to the interior of the chamber and suspended from a reciprocating rod or bar, *K*, moved back and forth by a pinion or gear, *L*, engaging in a rack, *M*, connected with the rod *K*. The pinion is mounted on a shaft, *N*, carrying two loose pulleys, *O O'*, and an intermediate fast pulley, *P*, motion being imparted to said shaft through the fast pulley by a straight belt, *Q*, and a crossed belt, *R*, alternately in reverse directions.

The scrapers are provided with steel blades or plates *J'*, which may be adjusted to conform closely to the contour of the walls or to compensate for wear.

The belts are alternately thrown upon the fast pulley *P* by shipping-fingers *S S' S''*, actuated by a lever, *T*, controlled by tappets *U U'*, which are struck alternately by the lugs or shoulders *V V'* on the inner and outer ends of the rack-bar *M*, as shown.

Any common or well-known form of belt-shipment device or other reversing-gear may obviously be substituted for that just described.

In order that the scrapers may adjust or accommodate themselves readily to any irregularities in the surface over which they travel, they are pivoted to the carrying rod or bar *K* and pressed outward by an intermediate spring, *W*, which yields to permit the scrapers to pass any unevenness in the surface of the walls.

The force of spring *W*, and the consequent pressure or position of the scrapers, may be regulated by adjusting the nuts *f g* upon the stem *h*, which carries the spring, thus carrying the spring into the narrower or wider space between said arms.

Doors are provided at the end of the apparatus, which may be opened to inspect or enter the interior.

It will readily be seen that by constructing the vessel or chamber *A* of oval or egg shape a number of them may be placed in a room containing less floor-space than if made of the usual form, as sufficient space will thus be left to pass between them. It is further advantageous in that it affords an extensive heating-surface, a large space in which to effect the separation and drying of the material, and steep walls from which the material will readily detach itself or be detached.

In many cases the outer casing, *B*, will be unprotected and exposed; but to prevent radiation it will in other cases be inclosed in brick-work or other heat-confining structure.

I am aware that a rotary shaft provided with stirrers has been arranged in the lower part of a steam-jacketed drying-chamber, and this I do not claim.

I am also aware that a shaft has been carried a short distance into a pipe or cylinder, and centered and held in place therein by a diaphragm, the outer end of the shaft being hollow; but I am not aware that any one has ever before proposed to construct a shaft in the manner herein set forth—that is to say, by carrying one tube within another and trussing between them from end to end.

Having thus described my invention, what I claim is—

1. An apparatus for drying and pulverizing refuse matter, consisting of a steam-jacketed cylinder and a rotary shaft composed of concentric pipes and intermediate trussing, provided with broad teeth or fingers located in the lower part of the chamber, and adapted to be rotated at a high speed, whereby it is caused to throw or project the material in a separated condition through the open interior of the chamber, as explained.

2. The herein-described drying apparatus, consisting of the steam-jacketed cylinder *A*, shaft *F*, located in the lower part thereof and armed with teeth or blades, scrapers *J*, and mechanism, substantially such as shown and described, for imparting a traveling motion to the scrapers, as set forth.



3. In a drying apparatus, a beater or agitator shaft composed of two concentric pipes, F G, and intermediate braces or trussing, substantially as shown and described.

5 4. The agitator-shaft consisting of concentric pipes F G, braces or trussing *d*, and end pieces, *e*, substantially as shown and set forth.

10 5. In a drier, a yielding or elastic reciprocating scraper, substantially such as described, provided with a rack, in combination with a pinion, and means for rotating the pinion alternately in reverse directions.

15 6. In combination with the rack-bar K and the scraper connected therewith, the pinion L, pulleys O, O', and P, belts Q R, and fingers S S' S'', arranged substantially as described and shown, whereby the belts are alternately passed upon pulley P, as and for the purpose specified.

20 7. The scraper J, consisting of arms pivoted to an intermediate support and separated and pressed outward by a spring, W, substantially as shown.

8. In combination with the pivoted scraper-

arms J, the intermediate threaded stem, *h*, and nuts *f g*, as and for the purpose described. 25

9. In a drier substantially such as described, a shaft composed of concentric pipes and intermediate trusses, as shown, and armed with broad teeth or arms, whereby the shaft is adapted to be rotated at high speed, and thereby to cause the material to be projected from the shaft into the open space of the containing-chamber, as explained. 30

10. The scraper J, provided with adjustable steel plates J'. 35

11. The herein-described drier, consisting of steam-jacketed chamber A, provided with feed and discharge openings, shaft B, having teeth H spirally arranged thereon, scrapers J, and means, substantially such as shown and described, for imparting a traveling motion to the scrapers, as set forth. 40

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Witnesses:

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