(No Model.) 2 Sheets—Sheet 1.

T. & H. SMITH.

DRIER.

No. 492,340. Patented Feb. 21, 1893.

FIG. 1.

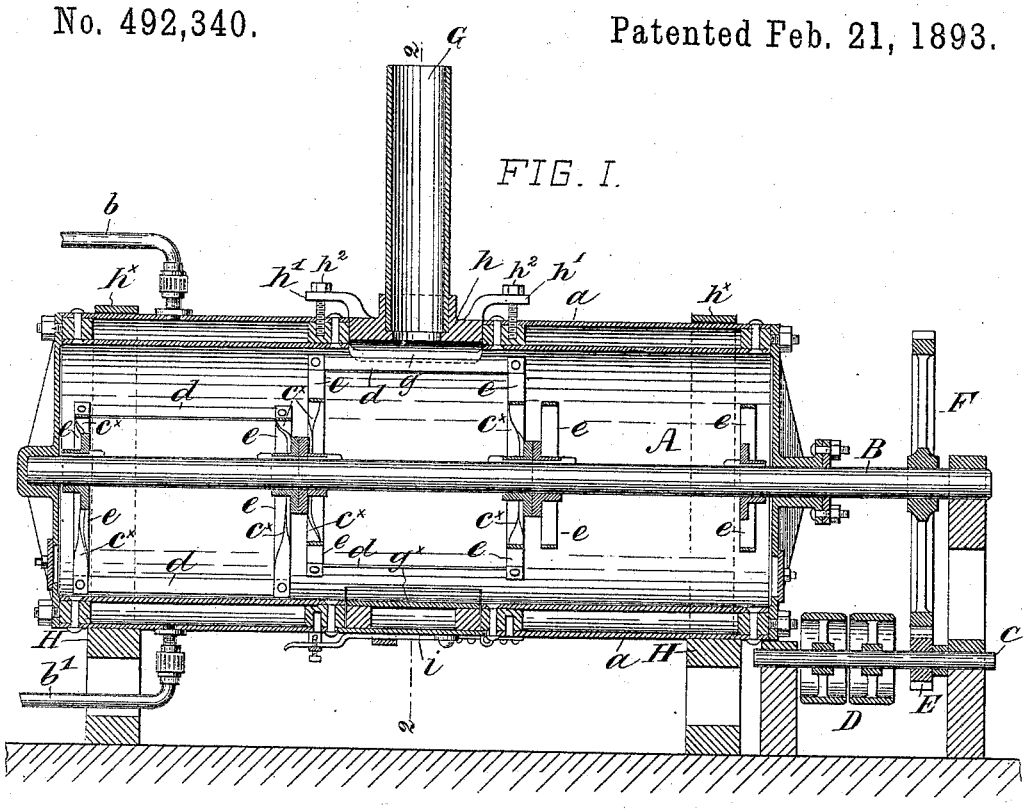
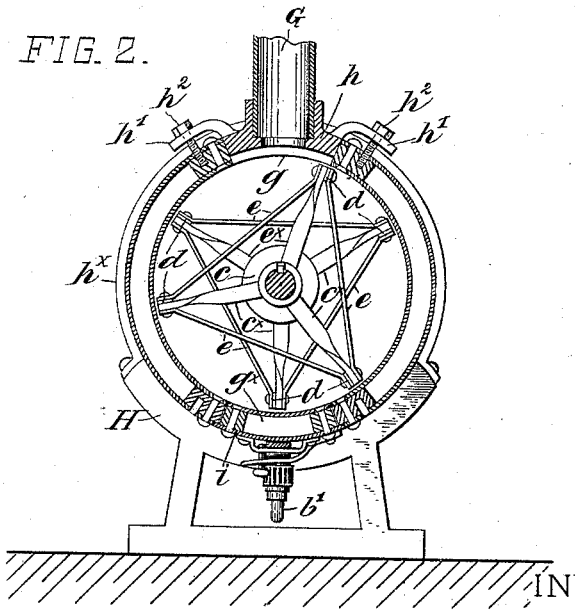


FIG. 2.



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(No Model.)

2 Sheets—Sheet 2.

T. & H. SMITH.

DRIER.

No. 492,340. Patented Feb. 21, 1893.

FIG. 3.

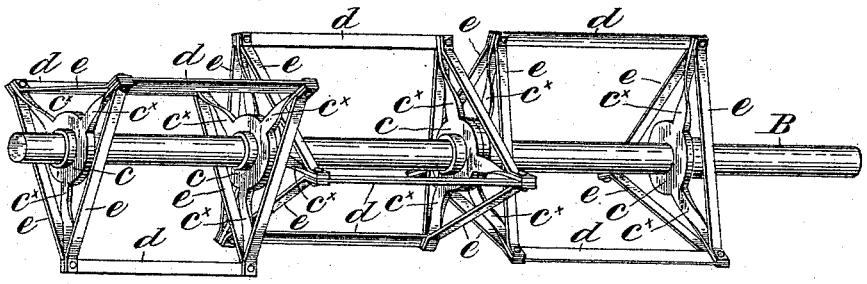
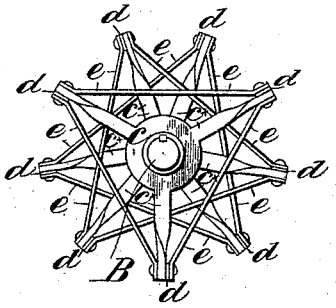


FIG. 4



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UNITED STATES PATENT OFFICE.

THEODORE SMITH AND HENRY SMITH, OF JERSEY CITY, NEW JERSEY.

DRIER.

SPECIFICATION forming part of Letters Patent No. 492,340, dated February 21, 1893.

Application filed April 23, 1892. Serial No. 430,312. (No model.)

To all whom it may concern:

Be it known that we, THEODORE SMITH and HENRY SMITH, both citizens of the United States, residing at Jersey City, Hudson county, New Jersey, have invented certain Improvements in Driers, of which the following is a specification.

Our invention relates to the class of apparatus employed for reducing animal offal to fertilizing powder by means of heat and a stirring apparatus. This form of apparatus consists, ordinarily, of a cylinder embraced by a steam jacket, and having in it a rotary stirrer whereby the contents of the drum are constantly stirred and agitated during the process of drying and disintegration.

Our invention relates in part to improvements in the rotary stirrer and in part to the special construction of the device whereby the cylinder may be reversed by partial rotation so as to compensate for wear, all as will be hereinafter more particularly set forth and the novel features carefully defined in the claims.

In the accompanying drawings which serve to illustrate a drier provided with our improvements—Figure 1 is a longitudinal mid-section of the drier and Fig. 2 is a transverse mid-section thereof. Fig. 3 is a perspective view of the stirrer, detached and Fig. 4 is an end view of the same.

A represents the cylinder of the apparatus and *a*, the steam jacket which incloses the same. This jacket communicates with a steam boiler, not shown, through the medium of two steam pipes *b* and *b'*. The offal is inserted at an opening at the top or upper side of the cylinder and the dried and disintegrated material is removed at a corresponding opening in the bottom or lower side of the cylinder. In the longitudinal axis of the cylinder is rotatively mounted a shaft B, in which are secured the stirring blades and this shaft is, or may be driven through the medium of mechanism clearly seen at the right in Fig. 1. As here shown this mechanism consists of a counter-shaft C, having on it tight and loose pulleys D, and a pinion E, which gears with a spur wheel F, on the shaft B. G is an outlet for the gases and this may connect in a well known way with a condenser for such gases.

So far as above described, the apparatus presents no novel features; but heretofore so far as we are aware, the stirrer fixed on the shaft B has been composed of radial arms on the shaft arranged in line, and having secured to each set or row of arms a stirring blade which extends the entire length of the cylinder and is arranged parallel with the shaft B. The objection to this construction is that each blade must take under the entire mass as the shaft rotates, and lift or move it and this while entailing the exercise of considerable power,—more than should be necessary to move the mass,—also puts the stirrer under an unnecessary strain which is not properly divided among the several blades. As the mass in the cylinder is quite heavy, especially during the early stages of the operation, this question of equalizing the strain on the stirrer blades is important.

Figs. 3 and 4 clearly illustrate our improved construction of the stirrer. We mount on the shaft B two or more stirring sections, the number of which is somewhat arbitrary depending on the length of cylinder A. Each section comprises, as here represented, two spiders *c*, each with three equally spaced radial arms $c^{\times}$; three stirring blades *d*, arranged parallel to the shaft B and secured to the respective arms of the spiders, as shown, and braces *e*, between the arms of the spiders to stiffen and strengthen them. There is nothing substantially novel in the construction of the stirrer section, but in arranging and securing them on the shaft they are set,—as clearly seen in Fig. 4,—so that no two of the blades *d* are in line, the nine blades on the three sections occupying different radial positions whereby when the shaft is rotated, the several blades on the several sections come into operation successively, one after the other, and each operates only on that portion of the mass comprised within its length and not throughout the entire length of the cylinder A. Thus there will be with the construction shown in Figs. 3 and 4, at least, three blades in action in the mass at the same time, but at different points in the length of the cylinder. We find this construction of the stirrer produces better results than the old style stirrer and these results are attained with less expenditure of power.

We prefer three blades to a section of the

stirrer, but good results may be attained with other numbers of blades. The essential feature is that the stirrer shall be in like or similar sections and these sections shall be set each with its blades arranged in advance of those on that next adjacent, or in a different radial plane, whereby such blades are adapted for successive operation on the material, as set forth.

We find that the bottom plates of the cylinder A become abraded and worn to a greater extent than the other plates by reason of the mass being constantly moved over them by the stirrer and this renders it necessary to renew these plates before the remainder of the cylinder is worn to any material extent; and in order to give the cylinder a longer life, we mount it on support H (see Figs. 1 and 2) in bands $h^{\times}$, so that it may be turned half-way round about its axis when the bottom plates are worn, and the upper plates thus brought to position to receive the wear. To do this, however, it is necessary that the charging opening g and the discharging opening $g^{\times}$ shall be oppositely arranged and be of the same form and dimensions, whereby the cover h and the hinged door i, may be fitted to either opening at will, it being only necessary to hinge the door i on the outer wall of the cylinder at the opening g after the cylinder shall have been turned half-way over. The cover h has four securing lugs h', through which are screwed the screws h^2, screw-holes to receive them being provided about both apertures or openings g and $g^{\times}$. The steam pipes b, and b', have unions by which they are coupled respectively, to spuds or nipples on the steam jacket above and below, and these nipples will be arranged at opposite points in order than when the cylinder is turned half-way round, the steam pipes may be secured properly in place as before.

Having thus described our invention, we claim—

1. In a drier, the combination with a cylinder provided with a steam jacket and a longitudinal stirrer shaft rotatively mounted in said cylinder, of a stirrer mounted on said shaft, said stirrer being made up of sections having three blades each and divided by planes transversely of the shaft, the blades on the respective sections being arranged in different radial planes and adapted thereby to be brought into operation successively when the stirrer is rotated, substantially as set forth.

2. In a drier, the combination with a cylinder provided with a steam jacket and a stirrer shaft rotatively mounted in and extending longitudinally through said cylinder, of a stirrer fixed on said shaft, said stirrer being made up of sections, each of which comprises two three-armed spiders, and three stirring blades fixed to the arms of the spiders and arranged parallel to the shaft, the said stirrer sections being set on the shaft with the several stirring blades in different radial planes, whereby they come into play in regular order or succession, as the stirrer rotates, as set forth.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

THEODORE SMITH.
HENRY SMITH.

Witnesses:
MARY I. G. MCCARRON,
JOHN GRIFFIN.