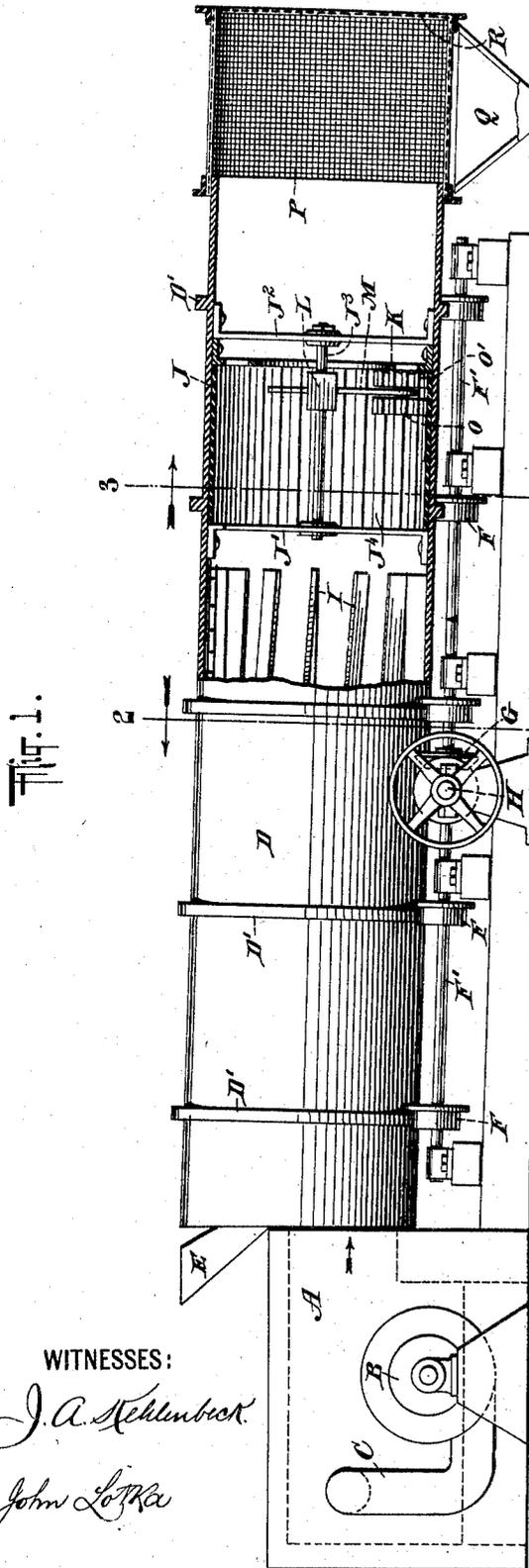


L. RISSMULLER.
APPARATUS FOR DRYING, GRINDING, AND SCREENING.

APPLICATION FILED JAN. 31, 1903.

2 SHEETS—SHEET 1.



WITNESSES:
J. A. Neulenbeck
John Laska

Fig. 5.

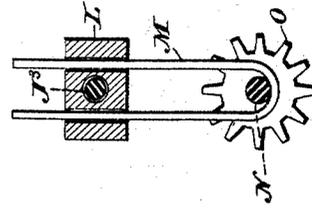


Fig. 4.

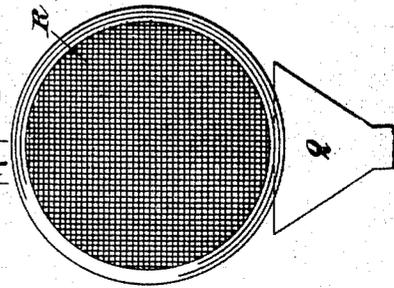


Fig. 3.

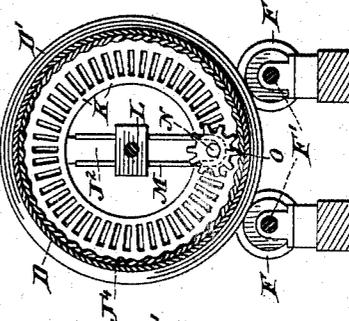


Fig. 2.

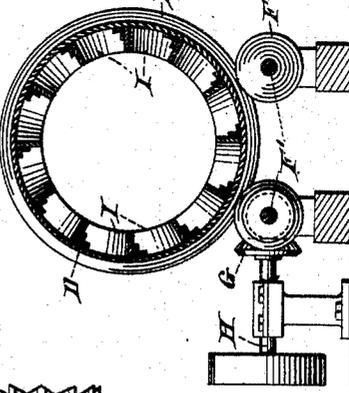
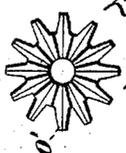


Fig. 7.



Fig. 6.



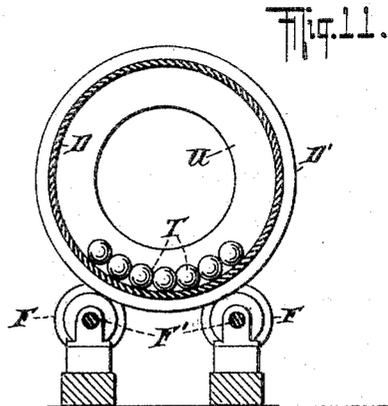
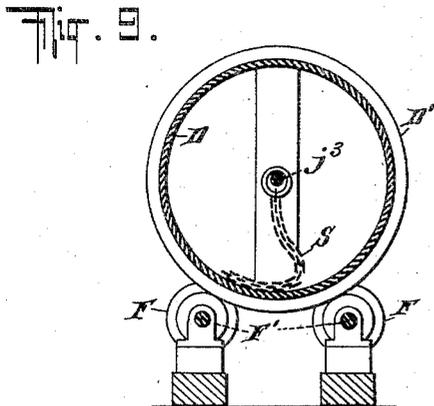
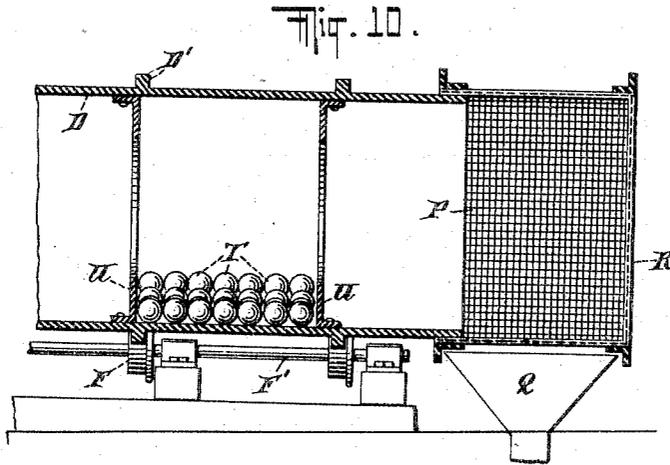
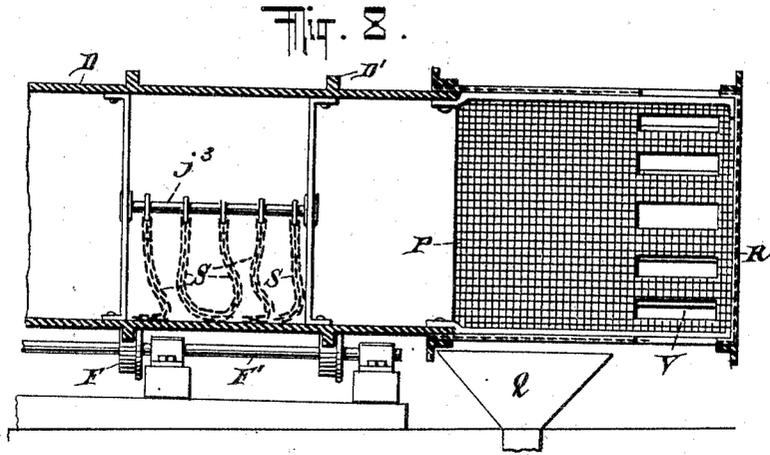
INVENTOR

Ludwig Rissmuller

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ATTORNEYS

L. RISSMULLER.
APPARATUS FOR DRYING, GRINDING, AND SCREENING.
APPLICATION FILED JAN. 31, 1903.

2 SHEETS—SHEET 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

LUDWIG RISSMULLER, OF NEW YORK, N. Y.

APPARATUS FOR DRYING, GRINDING, AND SCREENING.

SPECIFICATION forming part of Letters Patent No. 788,675, dated May 2, 1905.

Application filed January 31, 1903. Serial No. 141,305.

To all whom it may concern:

Be it known that I, LUDWIG RISSMULLER, a subject of the Emperor of Germany, and a resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Apparatus for Drying, Grinding, and Screening, of which the following is a specification.

My invention relates to apparatus for drying, grinding, and screening materials of various kinds, and particularly materials which are liable to form lumps or cakes, which interfere with a proper action of the drying medium. Besides, in many cases it is desirable not only to dry the material, but also to powder it, or at least to reduce it, to small particles and to separate the granules of proper size from the remainder of the material.

My invention is especially applicable to goods of a fibrous nature, such as meat.

According to my invention a rotary drying-drum is employed and a crusher or disintegrator is arranged within the said drum, and, further, the drum is provided with a screen, so that the material is not only dried, but crushed and screened without a complication of mechanisms, as the rotation of the drum directly operates the crusher and the screen.

In the accompanying drawings I have shown one form of my invention.

Figure 1 is a longitudinal view of the drum with parts in section. Figs. 2 and 3 are cross-sections on lines 2 2 and 3 3, respectively, of Fig. 1. Fig. 4 is an end view of the drum at the discharge portion. Fig. 5 is a detail illustrating the specific construction of the crusher. Fig. 6 is a face view of a crushing-roller employed in one form of my invention. Fig. 7 is an edge view of such roller. Fig. 8 is a longitudinal section, and Fig. 9 a cross-section, in another form of my invention in which chains are employed for crushing purposes. Fig. 10 is a longitudinal section, and Fig. 11 a cross-section, of a third form of my invention in which the crushing is effected by balls.

At A, I have indicated a furnace for heating the air which is supplied by the blower B through a pipe C. The heated air is dis-

charged in the direction of the arrow into the upper or receiving end of a drum D, which preferably is inclined downward from the receiving end to the discharge end. The receiving end of the drum D is open, and into said end projects the stationary hopper E or any other suitable feed device for introducing the material to be dried into the drum D. The drum is mounted to rotate in any suitable manner, and, as shown, the drum is provided with flanges D', which run on flanged rollers F, secured on shafts F', and one of these shafts is given motion, as by means of bevel-gearing G and a counter-shaft H. From the inlet end of the drum to a point nearer the outlet the drum forms a drying apparatus proper, although the drying action takes place throughout the length of the drum. In this drying-section the material fed through the funnel or hopper E travels lengthwise—that is, toward the outlet—partly owing to the inclination of the drum and the rotary motion imparted to it and partly owing to the provision of spiral blades or ribs I upon the inner surface of the drum. Between the drying-compartment and the outlet is located a crusher-compartment J, which may be constructed in various manners. In the particular construction shown in Figs. 1 to 3 the spiders J' J² are located at the ends of the crusher-compartment, and these spiders are connected by a central rod or shaft J³. In addition to this there is provided between said spiders a perforated partition or screen K, which is located at the outlet end of the crusher-compartment. On the shaft J³ is loosely mounted, so as to be capable of remaining stationary while the drum rotates, a block L, carrying a support M for the crusher-shaft N. The support M is made in the shape of a U, so that the crusher-shaft may move up and down between the bars of its support. The crusher proper, O, consists of a rotatable body arranged to rest on the material and to crush the same. The mere weight of the crusher and its frictional contact with the material and with the inner wall of the drum would be sufficient to cause it to rotate as the drum revolves. During such movement the crushing-roller O might travel slightly upward with the drum, so as

to cause the support M to assume an inclined position; but very soon the weight of the crushing-roller will cause it to drop back substantially in vertical alinement with the shaft

5 L. To insure a proper rotation of the crushing-roller and to increase the crushing action, I may provide a toothed or corrugated construction—such as is shown in the drawings, where the crushing-roller is made with

10 teeth—to cooperate with longitudinal ribs or corrugations J⁴ of the drum. The crushing-roller may be provided on that portion which faces the outlet with face corrugations O', so that it will grind the material

15 against the screen K. In order to enable the crusher to yield lengthwise in case any lumps should work between the crusher and said screen, the block L may be slidable lengthwise of the shaft J³.

20 At the lower end of the drum is located a cylindrical screening-surface P, which extends over a stationary collecting-hopper Q for conveying the treated material to its place of use or storage. The lower end or head of

25 the drum is provided with a screen R. The material fed through the hopper E is at once brought in contact with the hot air or other drying medium, so that the hot air

30 comes in contact with the material which contains the most moisture. The downward inclination of the drum and its rotation, assisted by the spiral ribs I, feed the material toward the crushing-compartment J. Here

35 any lumps that might interfere with the proper drying of the material are broken up by the crushing-roller, so that every portion of the material will be exposed to the hot air. Thus a thorough drying of the material and

40 at the same time a disintegration of it are assured. Experience has shown that the material will form or contain lumps and that no proper drying is possible with a rotary drum unless these lumps are broken up during the drying process. The material then

45 passes to the screen P and is delivered into the hopper Q, the screen R acting as a retainer to prevent material from working out at the lower end of the drum, particularly in

50 view of the fact that the air-current which passes through the drum has a tendency to blow out the crushed material. The draft will therefore carry away only material that is very fine, it being understood that the screen R is of much finer mesh than the

55 screen P. In Figs. 8 and 9 I have illustrated a different construction of the crusher. Here the material is disintegrated by the action of chains S, which are loosely suspended from

60 the shaft J³. In Figs. 10 and 11 the crushing is effected by means of balls T, loosely held between two partitions or flanges U, which form the limits of the crushing-compartment.

With some materials an absolutely perfect crushing action is practically impossible, and there will remain a small amount of imperfectly-crushed material which will constitute 65 tailings. In such a case I may provide a series of openings beyond the screen-surface P, as shown at V in Fig. 8, so that any lumps 70 which cannot pass through the meshes of the screen P will be discharged through the openings V.

Various modifications may be made without departing from the nature of my invention. While I have shown an imperforate 75 crushing-compartment, I desire it to be understood that in some cases the crushing-compartment might be perforated, so that the material would be forced outward directly by the crusher and screened practically at the same time that it is crushed. 80 In some cases it might be advisable to employ a series of crushers acting successively and a series of screening devices of different mesh, so 85 as to grade the final product. While I have shown a structure in which the material is introduced at the same end as the hot drying medium, I do not wish to be understood as limiting myself to such construction. 90

It will be understood that one of the important advantages of my invention resides in the fact that by simply rotating the drying-drum I not only cause the material to be fed lengthwise and to be thoroughly exposed 95 to the drying medium, but I further operate the crushing device and also the screening device by the rotation of the drum.

It will be seen that the outlet end of the drum is formed with a screened surface, and 100 this is of importance as a protection against accidents in case the drying agent should be too hot, so as to be capable of igniting dust or other inflammable material. In such a case the screen at the outlet will act substantially in the same manner as the screen 105 of a safety-lamp.

I claim as new and desire to secure by Letters Patent—

The combination with the drum of a U- 110 shaped support mounted therein loosely so as to be capable of turning about the axis of the drum, the bend or opening of said U-shaped support facing inwardly, toward the said axis, and a crushing-roller the shaft of 115 which is received between the members of said support so as to be capable of sliding toward and from the axis of the drum.

In testimony whereof I have signed my name to this specification in the presence of 120 two subscribing witnesses.

LUDWIG RISSMULLER.

Witnesses:

ALBERT C. WIECHERS,
OTTO V. SCHRENK.