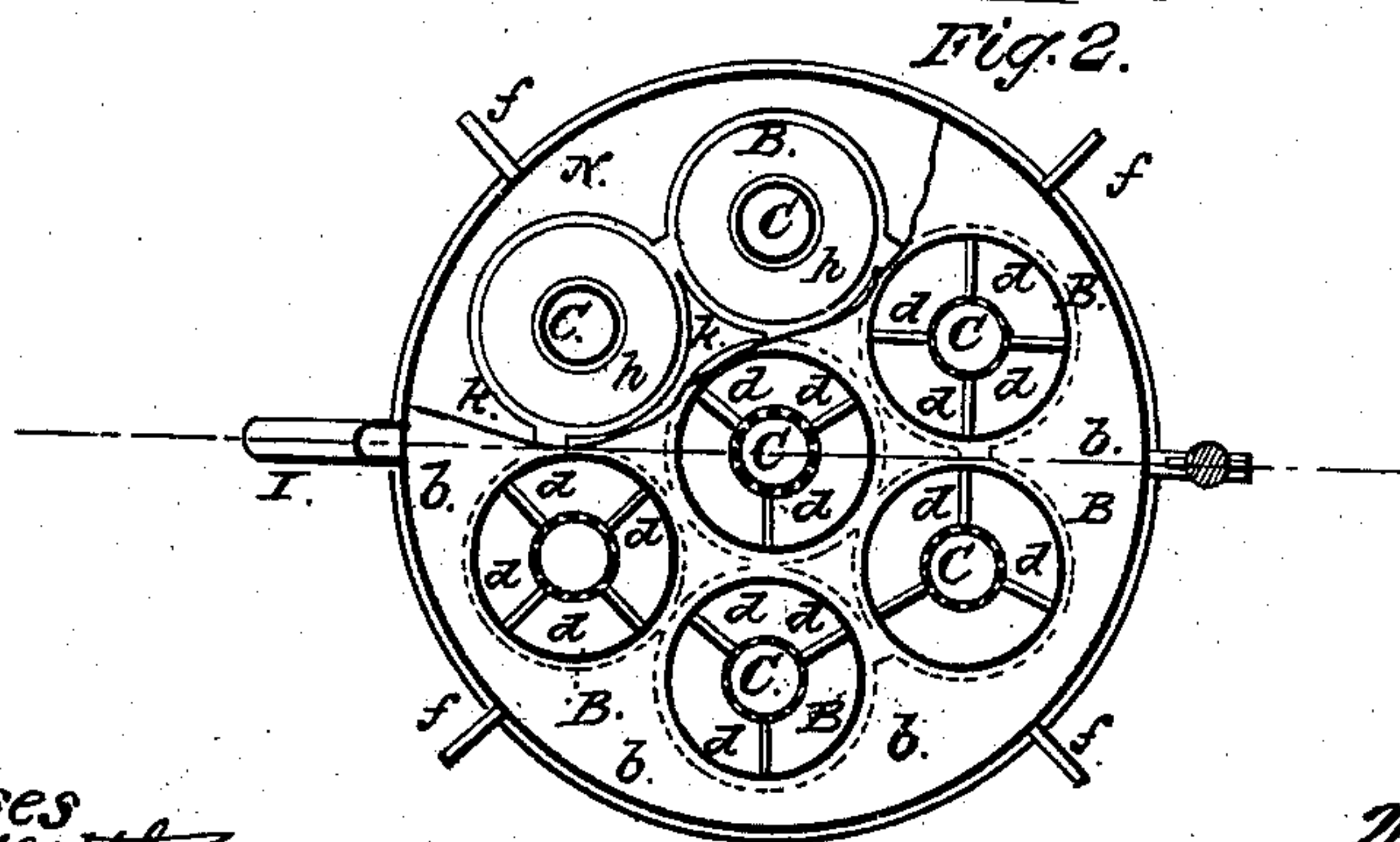
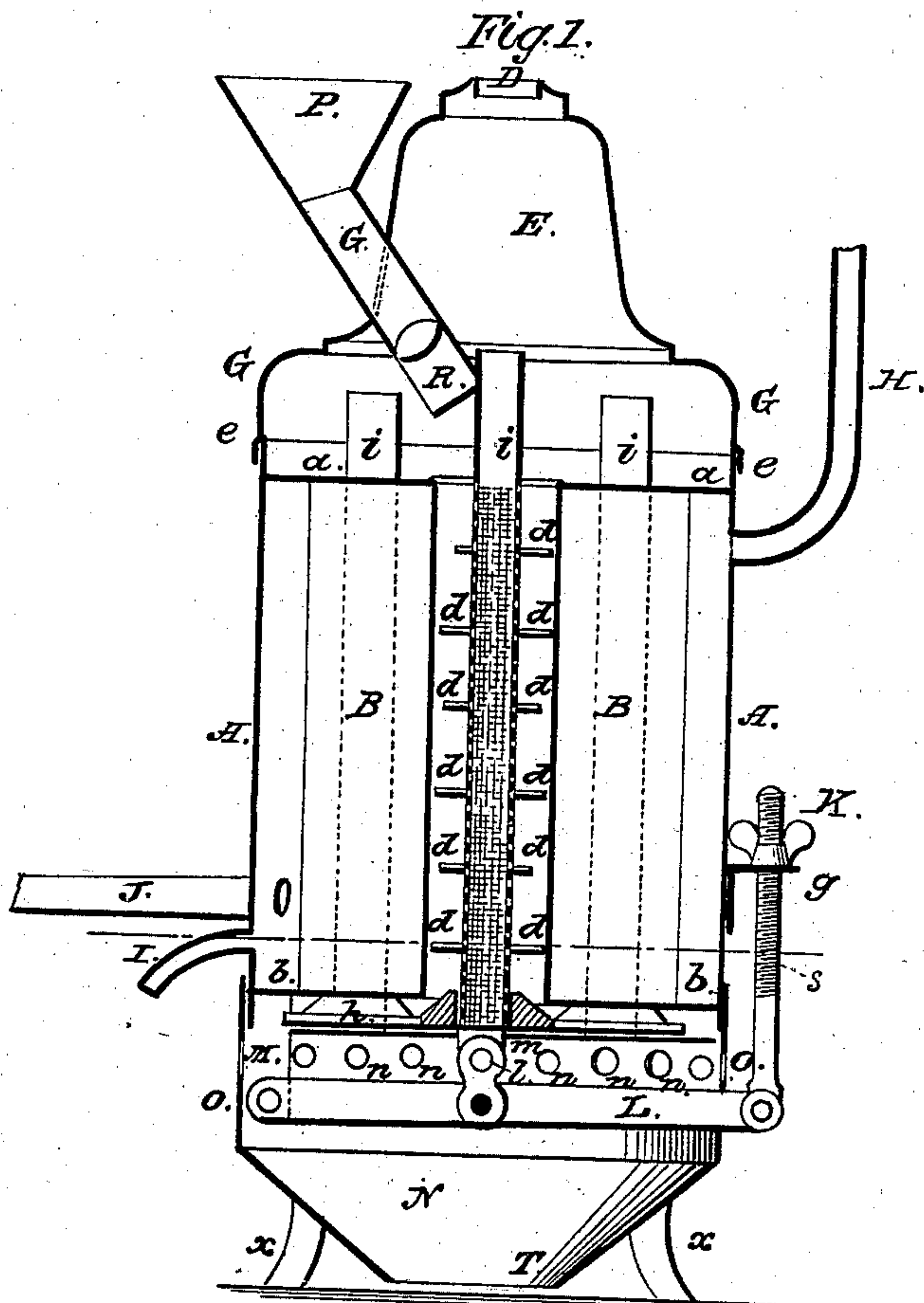


W. STANDING.

Grain Drier.

No. 79 699.

Patented July 7, 1868.



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# United States Patent Office.

WILLIAM STANDING, OF CAIRO, ILLINOIS.

*Letters Patent No. 79,699, dated July 7, 1868.*

## IMPROVEMENT IN GRAIN-DRIERS.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, WILLIAM STANDING, of Cairo, in the county of Alexander, and State of Illinois, have invented a new and useful Improvement in Grain-Driers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical section of my invention, through the line *x x* of fig. 2.

Figure 2 is a cross-section of the same through the line *y y* of fig. 1.

Similar letters of reference indicate corresponding parts.

The object of this invention is to accomplish the drying of grain in an expeditious and effective manner, and is designed for use in steam grist-mills, where the waste steam from the engine may be utilized in drying the grain, but is equally applicable in other situations where steam can be obtained.

It consists, in general terms, of a steam-chamber containing grain-cylinders, through which the grain is passed, and around which cylinder is a steam-space.

It also consists of valves for adjusting the rapidity of the passage of the grain through the said cylinders.

It further consists of perforated or wire-cloth tubes, located within the grain-cylinders, and through which an upward current of air passes, to assist in drying the grain, and to bear away the moisture expelled from the same.

It further consists of a receiving-chamber at the base of the apparatus, which is formed with lateral openings to admit the air to the lower ends of the said perforated tubes, and also formed with a conical bottom, to receive the dried grain falling from the grain-cylinders and conduct it to the discharge-opening formed by the truncation of the said conical bottom.

A chamber, having a receiving-hopper for the entering grain, surmounts the apparatus, and into this latter chamber the upper ends of the grain-cylinders and the perforated tubes open, the latter projecting somewhat above the former to prevent the grain from escaping into them.

The moisture expelled from the grain escapes at an opening in the upper part of a cap forming part of the upper chamber, and the perforated tubes are provided with a number of radial arms or spines, which extend across the space, between the exterior of the said tubes and the interior of the grain-cylinders, and which serve to stir up the grain as it descends, thus conducing to a more equable desiccation of the same.

Other devices, perfecting the whole, render the apparatus thoroughly effective, and the said devices, together with the parts above described in general terms, will now be set forth more exactly.

In the drawings, the steam-chamber consists of a drum, A, having heads, *a a*, *b b*, through which the grain-cylinders B B B B B B are affixed, by any suitable joint, which unites the edges of the upper and lower ends of the said cylinders with the heads *a a* and *b b* respectively, thus leaving a steam-tight space surrounding the cylinders, and leaving the latter open at the top and bottom, for the passage of grain through them.

The perforated tubes C C C C are much smaller than the grain-cylinders, so that a sufficient space is left for the grain, and in practice I make the perforated tubes with a diameter about one-third of that of the cylinders, which proportion of space will allow the grain to be sufficiently aerated in its passage downward.

The radial spines *d d*, &c., are affixed to the tubes and the inner walls of the grain-cylinders, and serve, as before stated, to stir up the descending grain, and also to hold the tubes centrally and firmly within the grain-cylinders.

That portion of the tubes which projects above the tops of the cylinders is not perforated, as the function of the said portion is to conduct the expelled moisture away from the grain, toward the opening D in the upper part of the cap E surmounting the top chamber G, which latter is formed with a shoulder-flange for fitting on to the upper edge of the drum, as shown at *e e*, whereby the said chamber is easily removed or replaced, as occasion may require.

A hopper, P, is connected with the chamber G, by means of a tube, Q, which terminates in a bifurcation,



R, within the chamber. The grain is poured into this hopper, and is thus distributed to the different grain-cylinders, and when these are fully charged, the grain fills a portion of the space above the head *a a*, and surrounds the projecting portions *i i* of the perforated tubes.

The steam is supplied to the drum A through the pipes J, and escapes through the exhaust-pipe H near the top of the drum.

I is a waste-water pipe leading from the opening of the drum near the bottom of the same, and is for the purpose of conducting off the water resulting from condensation.

The lower openings of the grain-cylinders are provided with annular valves, *h h h h h*, which serve to close the former completely, or to adjust the flow of the grain therefrom.

The valves are connected together, as shown at *k k k*, &c., fig. 2, in which figure a portion of the bottom head *b b* is broken away, to show the connection of the same. These valves are connected together at their proximate points, as before stated, which produces a system of valves susceptible of being operated simultaneously and equally, by means of any suitable mechanism, as that shown, which consists of a lever, L, pivoted to a standard, M, affixed to the lower head *b b*.

The opposite end of the lever is pivoted to a screw-rod, S, which is fitted with a burr, K, which latter serves, in connection with the plate *g* affixed to the drum, to raise or lower the lever L, and thus open or completely close the lower ends of the grain-cylinders or to adjust the valves, so that the grain may issue with more or less velocity, according to the rapidity with which it becomes dried.

In order that the valves may maintain a horizontal position in their vertical motion, they are attached to the lever L by means of a short plate, *l*, which is pivoted to the said lever, and to two lugs, *m*, cast or affixed to the bottom of the central valve.

The plate *l* is bifurcated, and each branch of the bifurcation is pivoted to a lug.

The upper surface of the valves is conical, as shown, to facilitate the passage of the grain from them.

The drum is supported by legs *ffff*, and also provided with a bottom chamber, *o o*, having lateral openings *n n n*, &c., and a truncated conical bottom, N, upon which latter the grain falls, and is conducted to the central opening T, to a chute or spout for conveying it to bins or other receptacles.

The air being heated within the tubes C, from its contiguity to the heated grain, ascends, and is supplied through the openings *n n*, to fill the vacuum, and the current thus produced encounters the moisture expelled from the grain by the heat of the steam surrounding the grain-cylinders, and bears it upward, thus accomplishing the desiccation of the grain in a rapid and equable manner.

The valves are closed until the first charge of grain becomes dried. They are then opened sufficiently to permit it to escape only as fast as the succeeding grain is thoroughly dried, and are adjustable to suit any circumstances which may conduce to a slower or more rapid rate of drying.

The apparatus is made of sheet or cast metal.

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

1. A grain-drier composed of a series of cylinders for the passage of the grain, each surrounding a central perforated air-tube, and all enclosed by a metallic case, forming a close steam-chamber, substantially as herein described, for the purpose specified.

2. The grain-drier, constructed as described, of the annular chamber B, enclosed between the heads *a b*, and each containing a central perforated tube, *c*, supported by radial arms *d*, and extended in imperforate pipes *i*, above the head *a*, for conducting the moisture to the chamber G E, the cylinders B being surrounded by the case A, to form the steam-chamber, all constructed and arranged as described, and supported upon the perforated conical base N, as herein set forth, for the purpose specified.

3. The arrangement of the valves *h*, supported upon the ring K, and adjusted by means of the bifurcated plate *l*, pivoted lever L, screw-rod S, and burr K, as herein described, for the purpose specified.

4. The arrangement of the close steam-chamber, the grain-cylinders B, and the perforated air-tubes C, having extended imperforate ends *i*, whereby the grain is heated by steam around the cylinders B, and the moisture discharged through the centre of said cylinders by the tubes C, as herein described, for the purpose specified.

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