

(No Model.)

H. CUTLER.
Steam Grain Drier.

No. 243,520

Patented June 28, 1881.

Fig: 1.

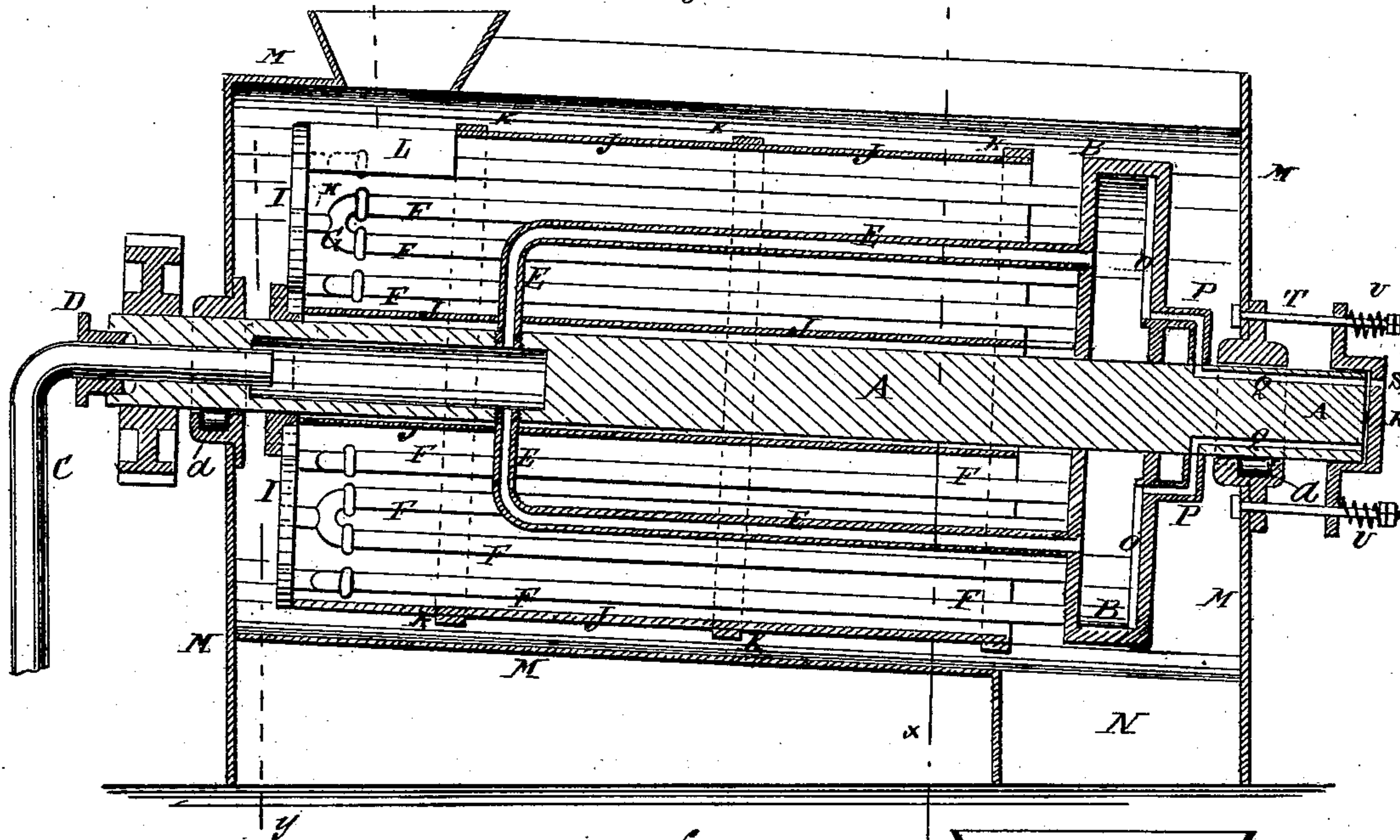


Fig: 2

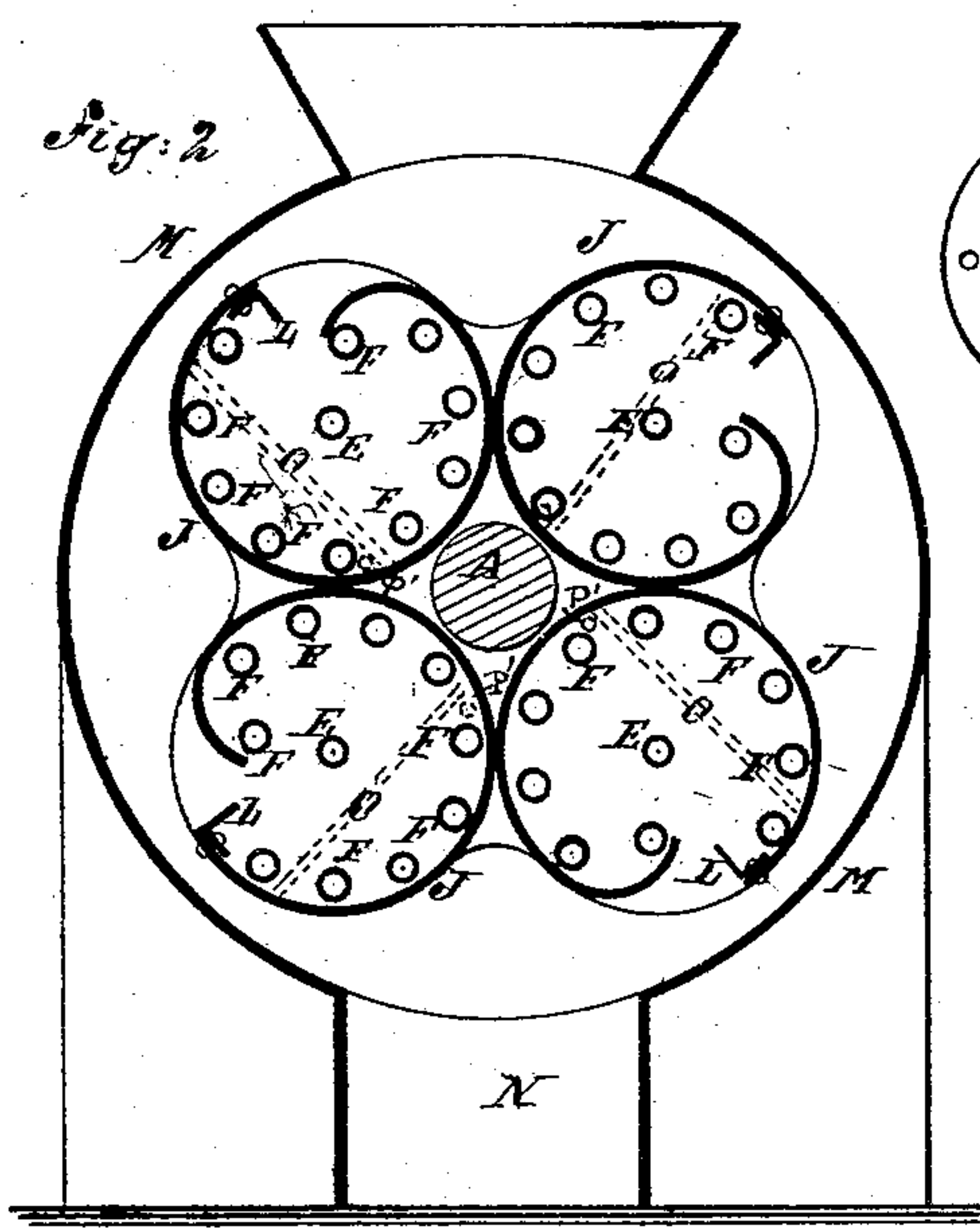


Fig: 5

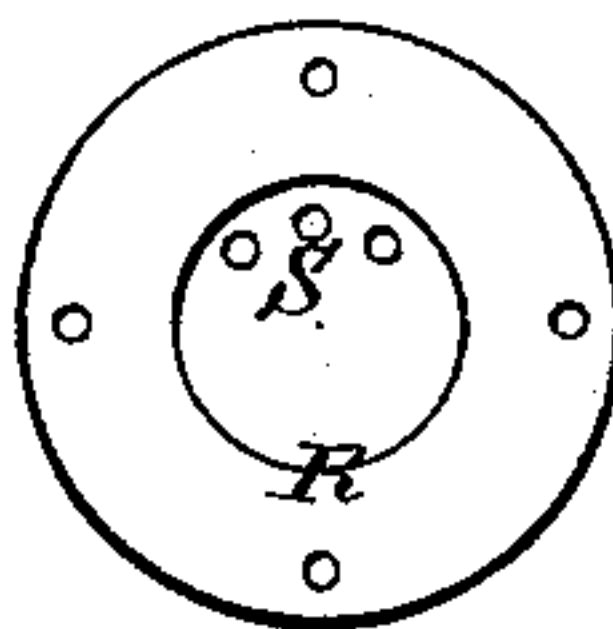


Fig: 6

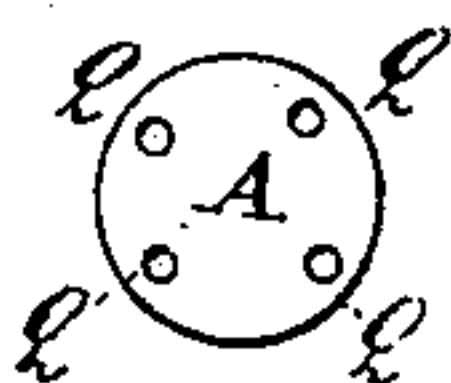


Fig: 3

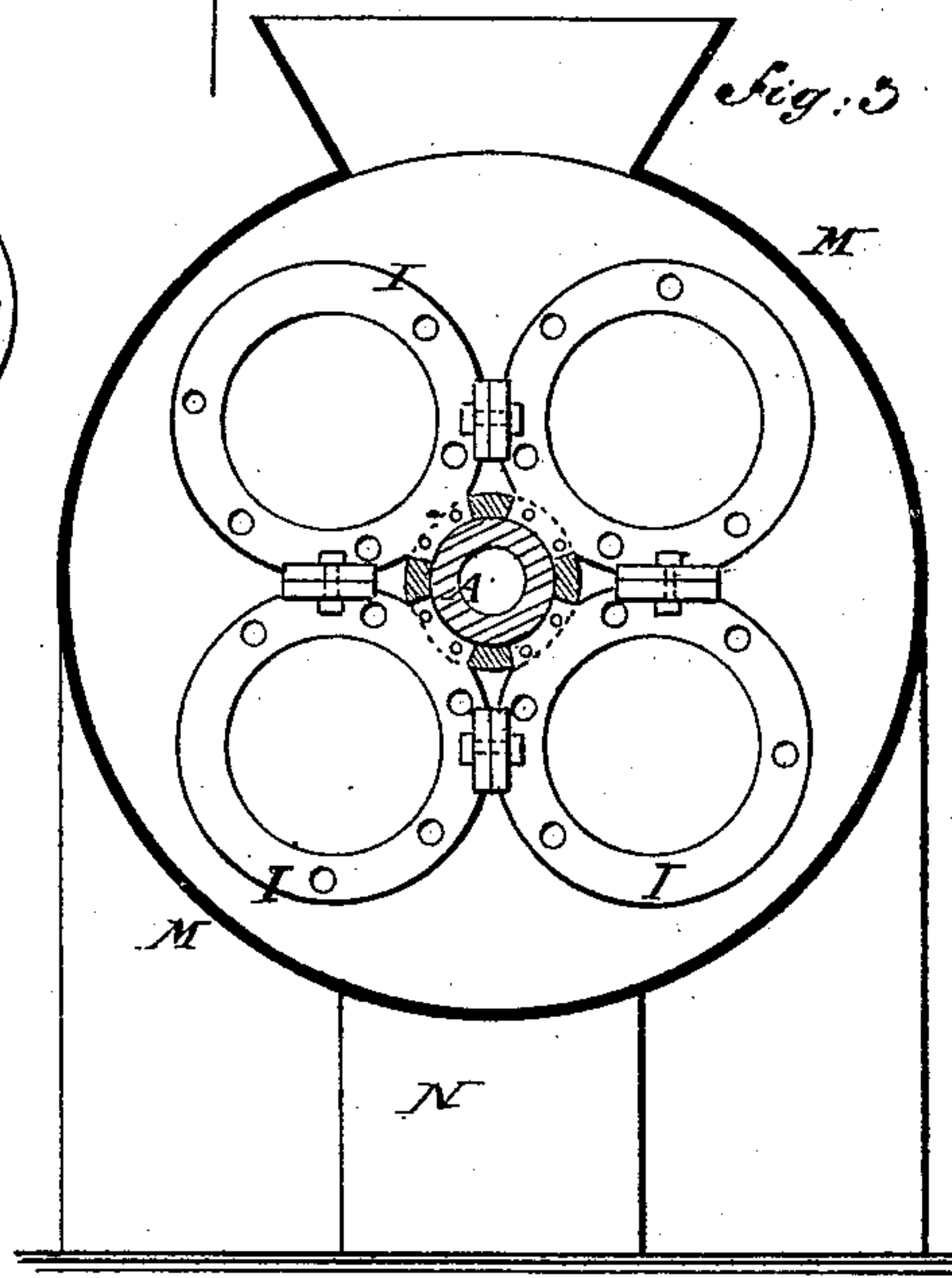
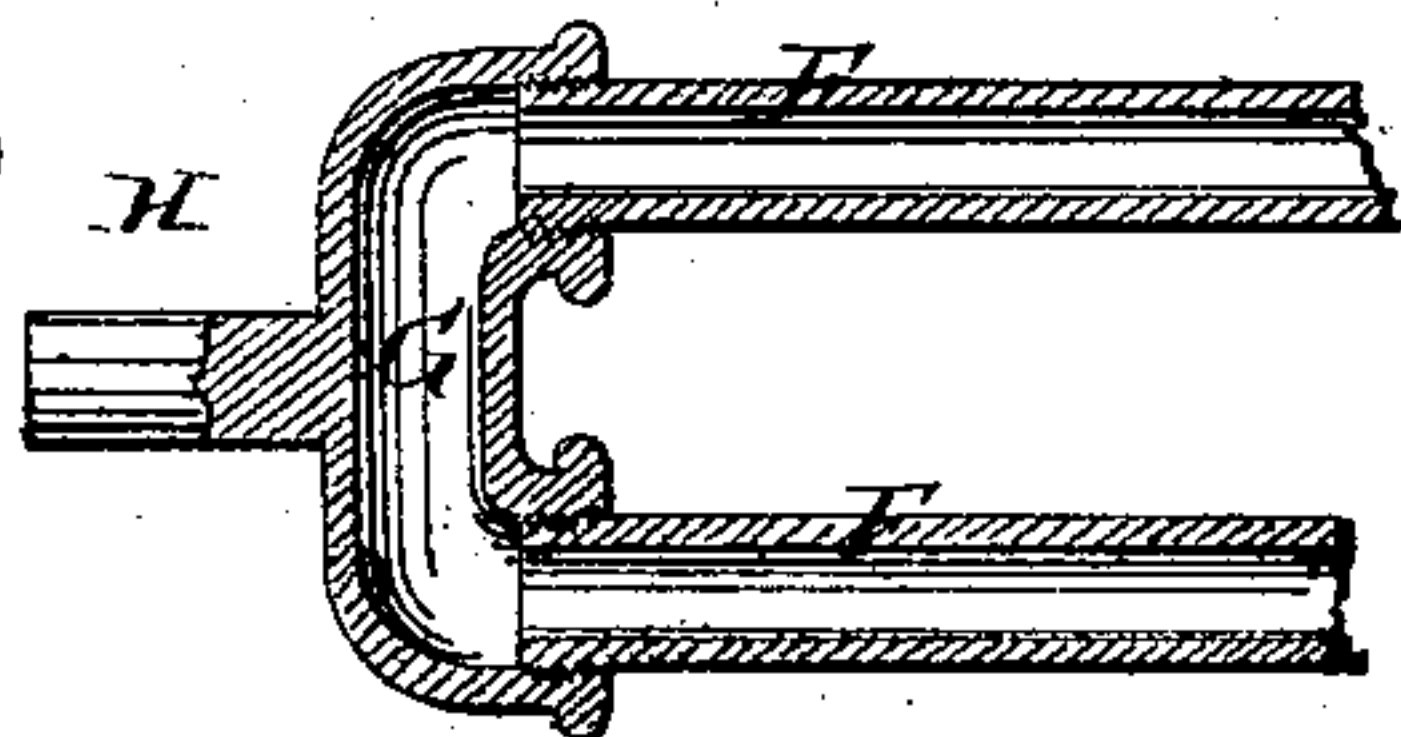


Fig: 4.

WITNESSES:

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UNITED STATES PATENT OFFICE.

HENRY CUTLER, OF NORTH WILBRAHAM, ASSIGNOR TO HIMSELF AND
GEORGE E. CUTLER AND B. T. THOMPSON, BOTH OF SOUTH FRAM-
INGHAM, MASSACHUSETTS.

STEAM GRAIN-DRIER.

SPECIFICATION forming part of Letters Patent No. 243,520, dated June 28, 1881.

Application filed October 29, 1880. (No model.)

To all whom it may concern:

Be it known that I, HENRY CUTLER, of North Wilbraham, in the county of Hampden and State of Massachusetts, have invented a
5 new and useful Improvement in Steam Grain-Driers, of which the following is a specification.

Figure 1 is a sectional side elevation of the improvement. Fig. 2 is a sectional end elevation taken through the line *xx*, Fig. 1. Fig.
10 3 is a sectional end elevation taken through the line *yy*, Fig. 1. Fig. 4 is a longitudinal section of a pair of steam-pipes, showing the return-bend. Fig. 5 represents the cap-plate. Fig. 6 represents the forward end of the shaft.

15 The object of this invention is to furnish steam grain-driers so constructed that their capacity can be increased to any desired extent without materially increasing the cost of construction, and which will allow convenient
20 access to be had to any part of the driers for stopping leakage, and other repairing.

The invention consists in constructing a steam grain-drier of a shaft made hollow at one end to receive the inlet-steam, and with
25 perforations at the other end to discharge the water of condensation, the head cast in one piece with one or more chambers, receiving steam through the conduction-pipes connected with the cavity of the shaft and distributing
30 the steam to the circulation-pipes forming the heating-surfaces, the return-bends connecting the circulation-pipes in pairs to induce circulation, and provided with gudgeons to slide in holes in a supporting-spider connected with
35 the shaft to allow free expansion and contraction, the sheet metal forming a backing for the circulation-pipes, the scoops to introduce the grain into the drying-cylinders, the exterior casing surrounding the drying-cylinders, and
40 the pipes and cap and its supporting-bolts and holding-springs connected with the steam-head, and the perforated forward end of the shaft for controlling the discharge of the water of condensation, all constructed and operating
45 as will be hereinafter fully described.

Similar letters of reference indicate corresponding parts.

A represents the shaft, which revolves in bearings in a suitable frame-work or support,

and can be driven by gear-wheels or pulleys 50 and belt from any convenient power.

To the shaft A, near its forward end, is attached a steam-head, B, which is cast in one piece and with one or more separate steam-chambers, so that there can be no leakage of
55 steam. The drawings represent the steam-head as having four chambers.

The shaft A can be made in sections, having flanges around their ends to receive the bolts by which the said sections are secured to each
60 other. The rear section of the shaft A is perforated longitudinally from its outer end to receive the inlet steam-pipe C; and is provided with a stuffing-box, D, to prevent any leakage of steam around the said inlet-pipe C. In the
65 shaft A, at or near the inner end of its longitudinal perforation, are formed as many radial perforations as there are separate chambers in the steam-head B.

In the radial perforations of the shaft A are
70 secured the ends of pipes E, which project radially to points in line with the centers of the chambers of the head B, at which points they are bent at right angles, and their ends are secured in holes in the inner wall of the head
75 B in such positions as to be at the centers of the chambers in the said head. The pipes E thus conduct the steam from the cavity of the shaft A to the chambers of the head B. In the inner wall of the steam-head B are formed
80 rows of holes in such positions as to enter the outer parts of the chambers of the said head, and in which are screwed or otherwise secured the ends of pipes F, so that the said pipes will receive steam from the said chambers. The
85 outer ends of the pipes F are connected in pairs by return-bends G, as shown in Figs. 1 and 4, to induce a circulation of steam through the steam-pipes F.

Upon the centers of the return-bends G are
90 formed gudgeons H, which enter holes in the ring-bars of the spider I, and slide in the said holes to allow the pipes F to expand and contract freely, so that the contraction and expansion of the pipes F cannot strain the joints
95 and cause leakage. The ring-bars of the spider I have perforated lugs or flanges upon the sides of the parts that come in contact, to re-

ceive the bolts by which they are fastened together. The ring-bars of the spider I have lugs or tenons upon the parts next the shaft A, to enter mortises in the shaft, or to enter a groove or fit between and be bolted to flanges upon a hub attached to the said shaft, to keep the said spider in place upon the said shaft. One pipe, F, of each set is set inward, and to the outer sides of the pipes of each set is attached a sheet-metal backing, J, forming a hollow cylinder. The sheet-metal backing J is strengthened and held in place by hoops K passed around it. The inward position of the inner pipe, F, and of the sheet metal J, attached to it, forms a shelf to receive and stop the grain, and thus prevent the grain from falling out through the openings in the cylinders while the said openings are downward.

To the hoops K at the upper end of the opening of each cylinder are attached scoops or shovels L, to take up the grain as the cylinders revolve and discharge it into the cavity of the said cylinder, which grain, as the cylinders revolve or are carried around the shaft A, passes along the inner surfaces of the said cylinders, being all the time in contact with a heated surface, and is discharged at the lower end of the drier at the steam-head B. The sheet metal J does not extend quite to the steam-head B, an opening or space being left all around each cylinder to allow the grain to escape freely. The drier is set in a slightly-inclined position, with the steam-head end the lowest, so that the grain will gradually pass from the higher to the lower ends of the cylinders as the drier revolves. The drier is surrounded with a casing, M, of sheet metal or other suitable material, and the grain is spouted into the said case at the upper end of the drier. The grain passes out at the lower end of the drier through a spout, N. The moisture expelled from the grain passes up through the opening of each cylinder as the said opening comes upward, and escapes through the opening in the top of the casing.

Upon the inner surface of the outer wall of the steam-head B, in each chamber, is cast a narrow transverse bar or flange, O, in an inclined position, to form a guide to conduct the water of condensation to a hole in the outer wall of the head B at the inner end of each bar O, (shown at P', Fig. 2,) through which it flows into a pipe, P, whenever by the revolution of the shaft each cylinder is brought to the top. The pipes P, at a little distance from the head B, are bent inward at right angles, and their other ends are connected with perforations Q formed longitudinally in the forward end of the shaft A. The forward end of the shaft A is covered with a cap, R, in the upper part of which are one or more holes, S—preferably three—in such positions that the perforations Q will come opposite the holes S in succession as they pass through the upper part of the revolution of the shaft A, so that the water contained in the pipes P and perfora-

tions Q, or a portion of the said water, will be constantly discharged as the said shaft revolves, the perforations Q not being uncovered long enough to allow steam to escape. The cap-plate R is secured in place by bolts T, attached to the frame-work that supports the drier, and which have spiral springs U placed upon them between their nuts and the plate R. With this construction the cap R will be held against the end of the shaft A by the tension of the springs U, and the wear will be taken up as it occurs. The bearings for the shaft A should be provided with rollers *a* to lessen the friction, and thus cause the drier to revolve more easily.

If desired, each chamber of the steam-head B can be provided with two rows of circulation-pipes, F, one row being set within the other, to increase the amount of heating-surface. In this case each pipe of one row can be connected with the corresponding pipe of the other row by a return-bend, or the pipes of each row can be connected in pairs, as hereinbefore described.

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

1. An improved steam grain-drier constructed substantially as herein shown and described, consisting of the shaft A, having its outer end perforated to receive the inlet steam-pipe C, the steam-head B, cast with one or more separate chambers to distribute the steam, the conduction-pipes E, to conduct the steam to the chambers of the steam-head, the circulation steam-pipes F, to form the heating-surfaces, the return-bends G, attached to the pipes F, in pairs, to induce a circulation of steam, and provided with gudgeons H, to work in holes in the bars of the spider I and allow free expansion and contraction, the sheet-metal backing J, the scoops L, the casing M, and the bars O, pipes P, perforations Q, and cap R, having perforations S, and its supporting-bolts T, and holding-springs U for withdrawing the water of condensation from the steam-head B, as set forth.

2. In a steam grain-drier, the narrow transverse bars or flanges O, formed upon the inner surface of the outer wall of the steam-head B, within the steam-chambers, substantially as herein shown and described, to receive the water of condensation and conduct it to the water-discharge pipes P, as set forth.

3. In a steam grain-drier, the steam-head B, having narrow transverse bars or flanges O formed upon the inner surface of its outer wall, in combination with the bent pipes P, substantially as shown and described, whereby the water of condensation is discharged from said steam-head.

4. In a steam grain-drier, the combination, with the circulation-pipes F and the cylinder A, of the return-bends G, having gudgeons H, and the spider I, made in sections, substantially as herein shown and described, whereby

the circulation-pipes are supported and allowed to expand and contract freely, as set forth.

5 5. In a steam grain-drier, the combination, with the steam-head B, having one or more steam-chambers, and provided with bars or flanges O, and the shaft A, having longitudinal perforations Q, of the bent pipes P, substantially as herein shown and described, whereby the water of condensation is discharged from the chambers of the steam-head, 10 as set forth.

15 6. In a steam grain-drier, the combination, with the shaft A, having water-discharge perforations Q, of the cap R, having perforations S in its upper part, and the bolts T and springs U, substantially as herein shown and described, whereby the escape of steam is prevented while discharging the water of condensation, as set forth.

20 7. In a steam grain-drier, the combination, with the set of steam-circulation pipes F, of the inclined sheet-metal backing J, the hoops K, and the scoops L, substantially as herein shown and described, whereby the grain is

taken up at one end of the drier and discharged 25 at the other end, as set forth.

8. In a steam grain-drier, the combination, with the shaft A, made hollow at one end, and the steam-head B, having one or more steam-chambers, of the conduction-pipes E, for introducing the steam into the chambers of the steam-head, and the circulation-pipes F, connected in pairs by return-bends, substantially as herein shown and described, whereby a great amount of drying-surface can be obtained, as 35 set forth.

9. The combination of the steam-circulation pipes F with a single steam-head, B, at one end and a spider at the other, having perforations in which the gudgeons H may slide, 40 whereby the pipes can expand and contract freely without straining the joints, substantially as set forth.

HENRY CUTLER.

Witnesses:

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