

(No Model.)

R. WIESEBROCK.

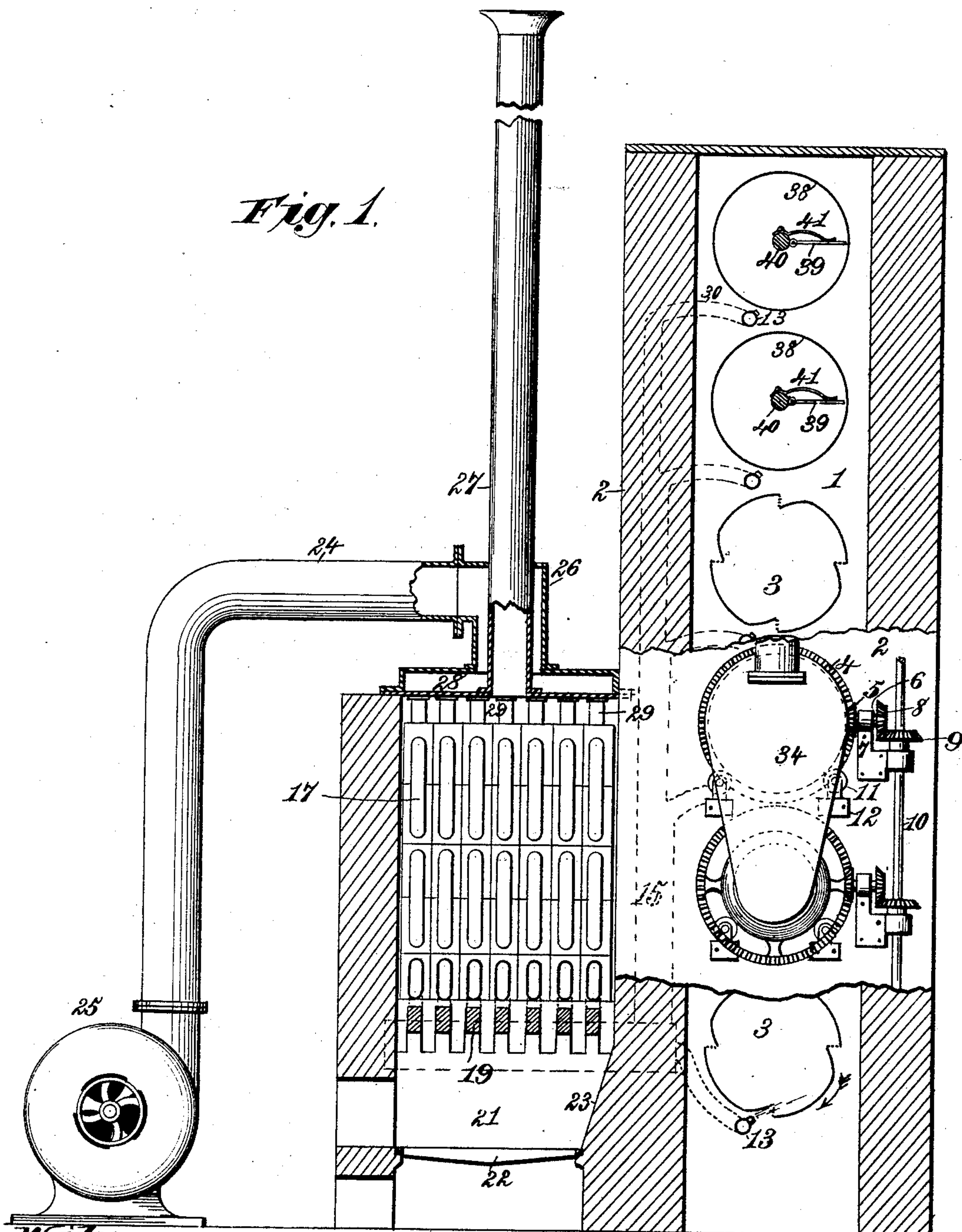
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GRAIN DRIER.

No. 348,650.

Patented Sept. 7, 1886.

*Fig. 1.*



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(No Model.)

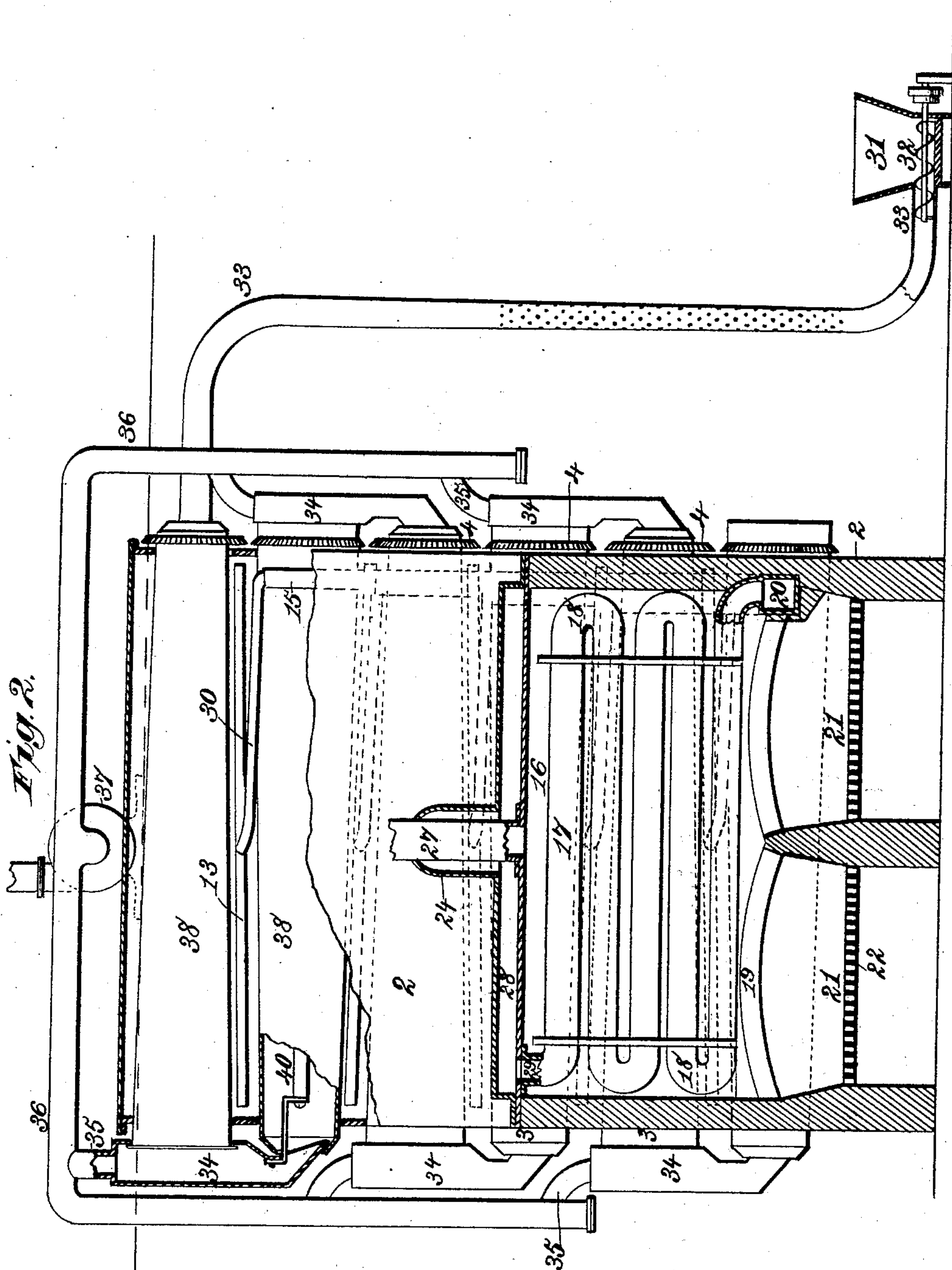
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GRAIN DRIER.

No. 348,650.

Patented Sept. 7, 1886.



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(No Model.)

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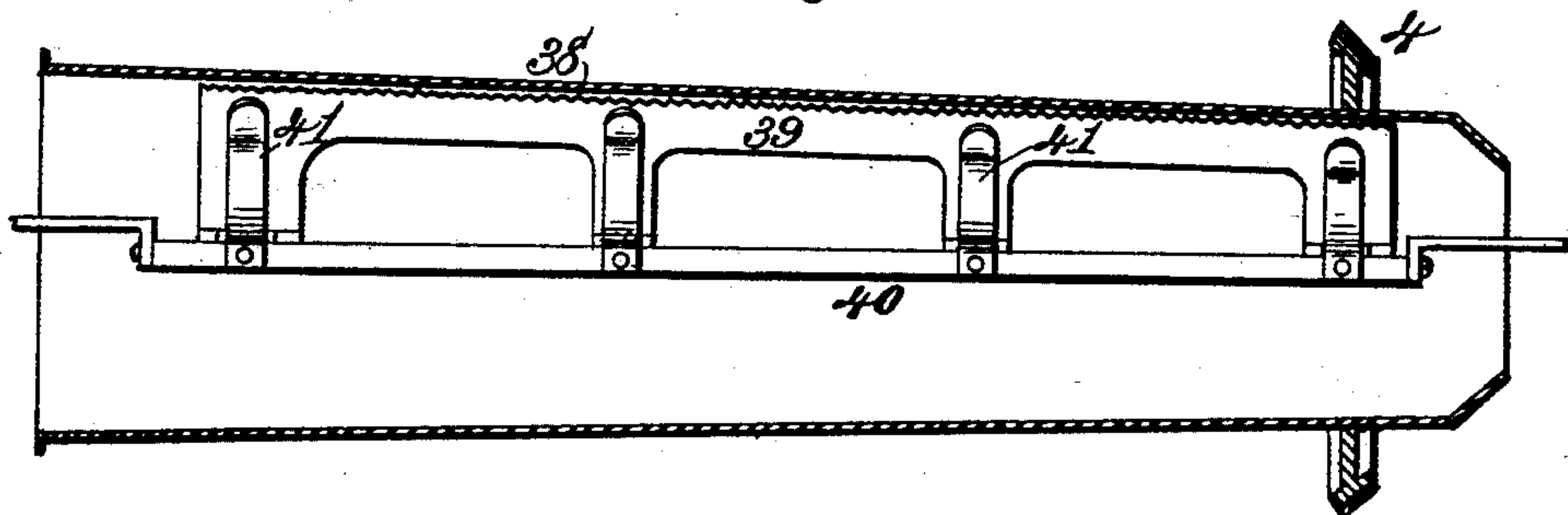
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GRAIN DRIER.

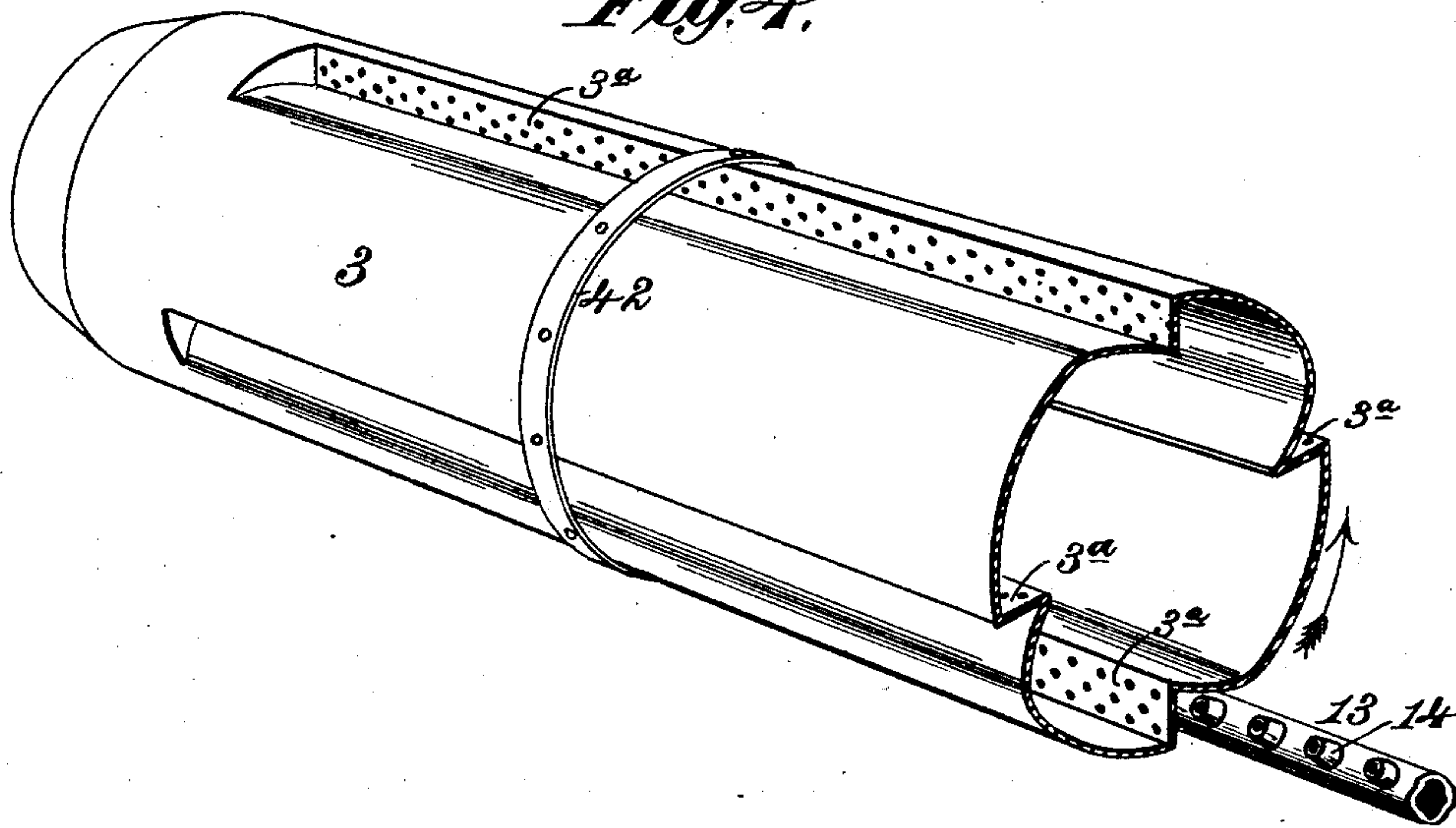
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*Fig. 3.*



*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

ROBERT WIESEBROCK, OF NEW YORK, N. Y.

## GRAIN-DRIER.

SPECIFICATION forming part of Letters Patent No. 348,650, dated September 7, 1886.

Application filed July 18, 1884. Serial No. 138,062. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT WIESEBROCK, a citizen of the United States, residing at New York city, New York, have invented new and useful Improvements in Grain-Drying Apparatus, of which the following is a specification.

This invention relates to apparatus for drying grain, and especially to mechanism for drying brewers' grains, refuse from starch and glucose factories, and similar substances.

The invention consists in the novel combination of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is an end elevation, part of the cylinder-casing being broken away to show the internal construction. Fig. 2 is a central vertical section taken from end to end through the cylinder-casing. Fig. 3 is a detail section taken from end to end of the cylinder, showing a modified construction. Fig. 4 is a detail perspective of one of the drying-cylinders removed from the machine.

In the said drawings, the reference-numeral 1 denotes a closed chamber or space, which is inclosed by any suitable walls; 2. Within this space are arranged any suitable number of drying-cylinders, 3, the construction of which will be hereinafter described. These cylinders are arranged one above another in such a manner that any material placed in the upper cylinder will by the means hereinafter described pass gradually therefrom into the second and thence into the third, &c. These cylinders are so arranged that each one has free rotation upon its own axis either in the same or in opposite directions—it is not material which. Upon one end of each cylinder is placed a miter-gear, 4, meshing with a small miter-pinion, 5, mounted upon a short shaft, 6, which has bearing in a journal-block, 7. Upon the outer end of the shaft 6 is mounted a second miter-gear, 8, which meshes with a driving-pinion, 9, upon the vertical shaft 10, from the rotation of which the cylinders 3 receive motion. The cylinders are supported by small friction-wheels 11, journaled upon blocks 12 in such a manner that while giving full support to the cylinder they will permit its free rotation. Beneath each cylinder is arranged a blast-pipe, 13, extending from end

to end of the cylinder, and lying in close contiguity thereto. These pipes are provided with a series of nipples, 14, each having an opening through which the hot blast from the pipe 13 is delivered. By reference to Fig. 4 it will be seen that the body of the cylinder is grooved or deflected inwardly at several points, said grooves being parallel, or substantially so, with the axis of the cylinder. This deflection of the cylindrical wall gives a longitudinal strip of metal, 3<sup>a</sup>, which is nearly in the plane of a radius to the cylinder. This strip is perforated, as shown, and as the cylinder revolves the blast-pipe 13 forces a current of air through the perforations into the interior and directs a continuous hot blast upon the surface of the cylinder at other times. These blast-pipes each are fed from a main pipe, 15, which is supplied with heated air in the following manner:

I arrange in convenient distance of the cylinder-casing a heating apparatus comprising a heating-chamber, 16, and a heating coil or coils, 17. Air is supplied to the pipe-coils by means of an air-pipe, 24, having one end connected with a blower, 25. The other end has an elbow-piece, 26, which surrounds the stack 27, through which the products of combustion pass off, and enters a heating-box, 28, which overlies the whole series of coils. From the bottom of this box open pipes 29, which are the upper extremities of the several coils 17. It will be seen that by forcing the air through the pipe 24 to the heating-box 28 it will thence pass into the coils, where it will be heated, and will thence be driven into the main pipe, whence it will pass to the several blast-pipes 13.

The drying-cylinders 3, as already stated, have a gradually-increasing diameter, whereby each cylinder approximates the form of a truncated cone. They are arranged in the cylinder-casing in such manner that the true axis of each cylinder is horizontal, whereby the lower side of the same will incline slightly downward from the small toward the larger end. The cylinder next beneath has a reverse arrangement, its small end being directly beneath the larger end of the one above, whereby material discharged from the large end of the upper cylinder may enter the small end of the one next below, &c. The blast-pipes 13



are fed by a supply-pipe, 30, which enters the blast-pipe in the center, in order that an equal volume of air may be supplied to each end of the blast-pipe.

5 The wet material is supplied to the upper cylinder by means of a tube, 33, connected at its upper end with the cylinder, and at its lower end with a hopper, 31, containing a revolving screw, 32. At the delivery end of  
10 each cylinder is a spout, 24, which receives the grain as it passes out of the cylinder, and conducts it to the receiving end of the cylinder next below. These spouts, which are stationary, fit around the delivery ends of the  
15 cylinders, and their lower portions fit within the receiving ends of the cylinders, as shown in Fig. 2. Connected with the top of each spout is a tube, 35, which connects with a main tube, 36, the latter having an exhaust-fan, 37,  
20 by which the air is drawn in a constant current from each cylinder, carrying with it the moisture it has absorbed.

When the apparatus is used for drying sticky substances, I employ a plain-surfaced  
25 cylinder, 38, of the kind illustrated in Fig. 3, and place inside the same scrapers 39, mounted upon a rigid bar, 40, and provided with leaf-springs 41, which hold the scrapers down against any resistance offered by the adhesion  
30 of the matter being dried to the surface of the cylinder.

In order to strengthen the cylinders, hoops 42 may be passed around them at any point, as shown in Fig. 4. The cylinders 3 project  
35 at each end through the cylinder-casing 2, which is constructed from sheet-iron, while the side walls, 2<sup>a</sup>, of said casing are built of brick.

When in operation, the grain is driven up  
40 through the tube 33 and delivered to the upper cylinder. The latter rotates slowly, receiving a constant blast of hot air from the blast-pipe 13, the air entering the perforated portion 3<sup>a</sup> as the cylinder revolves and being  
45 driven against the outer surface also. The rotation of the cylinder causes the grain to

gradually descend the inclined bottom until it reaches the end, when it is poured into the spout, and passes into the next cylinder, where the operation is repeated.

I do not claim the method of conveying grain to drying-cylinders and partly drying it at the same time by feeding the grain to a hopper and forcing it upward through a perforated pipe; nor do I here claim the devices for heating the air; and I do not here claim the combination, with rotating cylinders, of a perforated pipe of gradually-increasing diameter, a hopper, and a screw-conveyer for forcing the grain to the upper, one of the cylinders.  
60 These features will constitute the subject-matters of separate applications for Letters Patent.

What I claim is—

1. In a drying apparatus, a rotating drying-  
65 cylinder having longitudinal grooves or inward deflections, each containing a perforated plate for admitting hot air, and also stirring or agitating the material, substantially as described.

2. The combination, in a drying apparatus, of a drying-cylinder having longitudinal grooves or inward deflections, each containing a perforated plate, and a hot-air pipe for introducing hot air into the cylinder through  
75 the perforated plates, substantially as described.

3. In a drying apparatus, the combination, with a series of rotating cylinders contained within a closed casing, of a series of air-blast  
80 pipes arranged close to each cylinder, and having discharge-openings upon the side adjacent thereto, and feeding-pipes connected with said blast-pipes at or about their middle point, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT WIESEBROCK.

Witnesses:

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B. F. MELROSE.