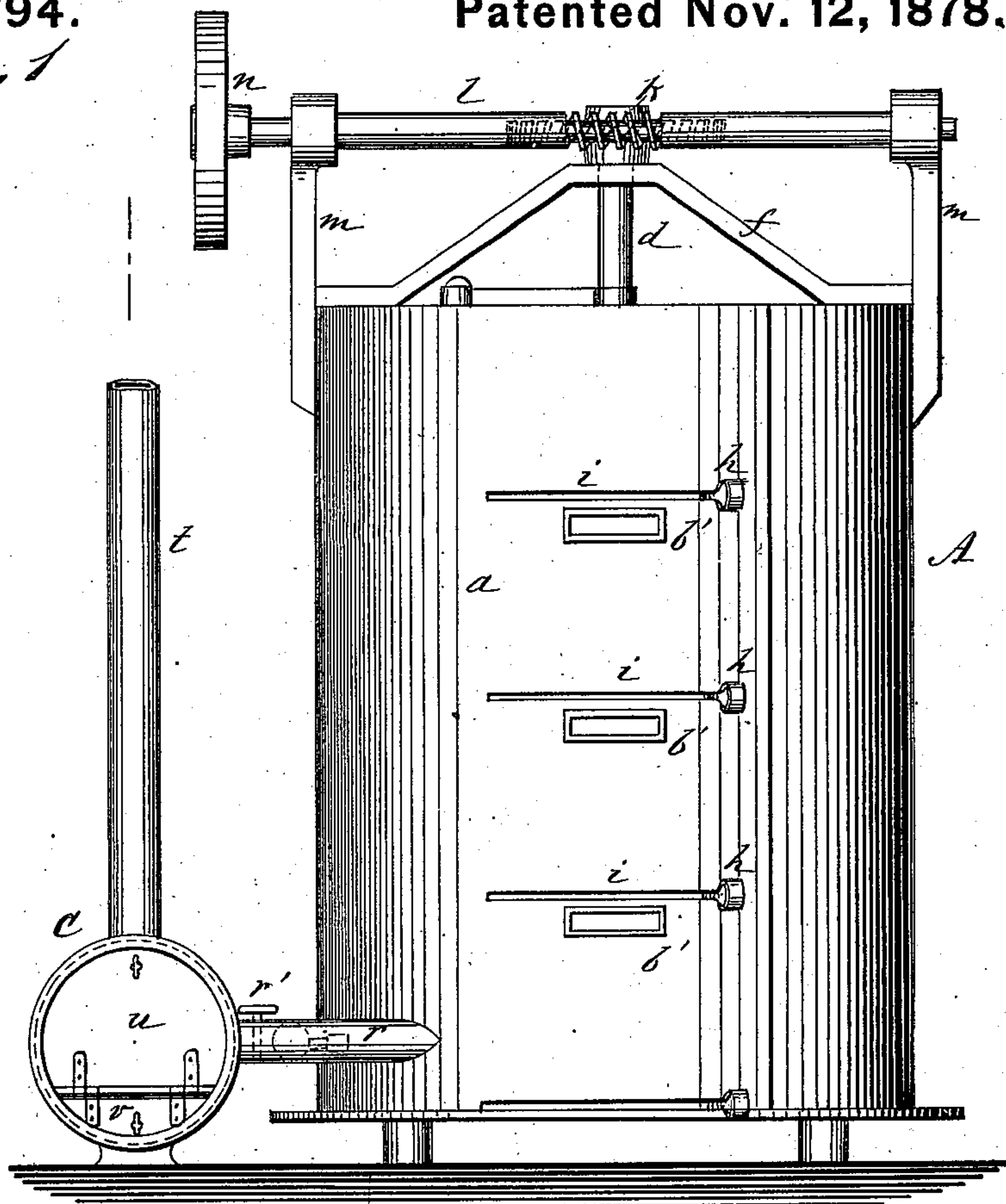


S. BEAVEN.  
Drier for Coffee, Cocoa, &c.

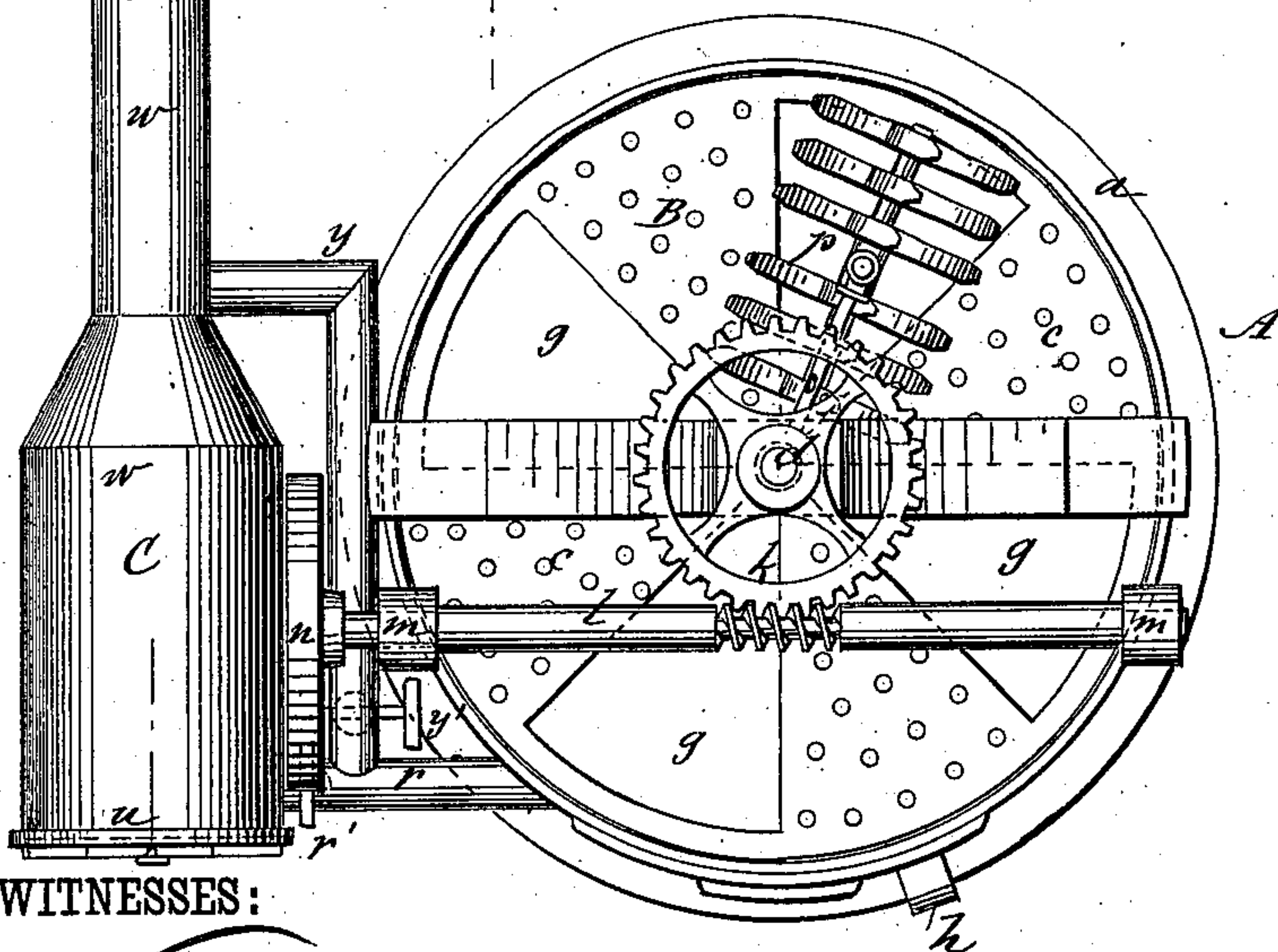
No. 209,794.

Patented Nov. 12, 1878.

*Fig. 1*



*Fig. 2*



WITNESSES:

*C. Newell*  
*C. Sedgwick*

INVENTOR:

*S. Beaven*

BY

*Minister*

ATTORNEYS.

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Fig. 3

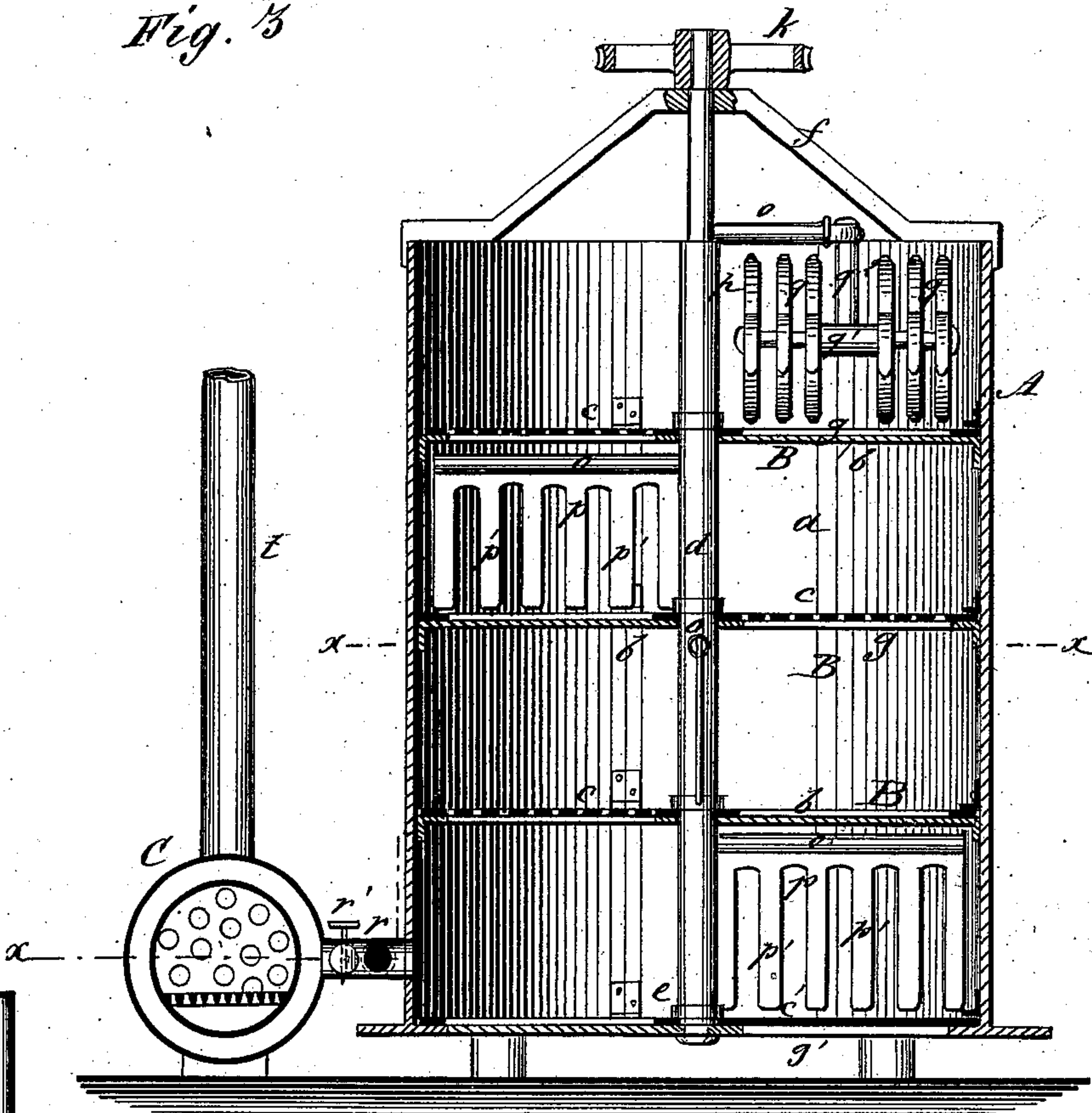
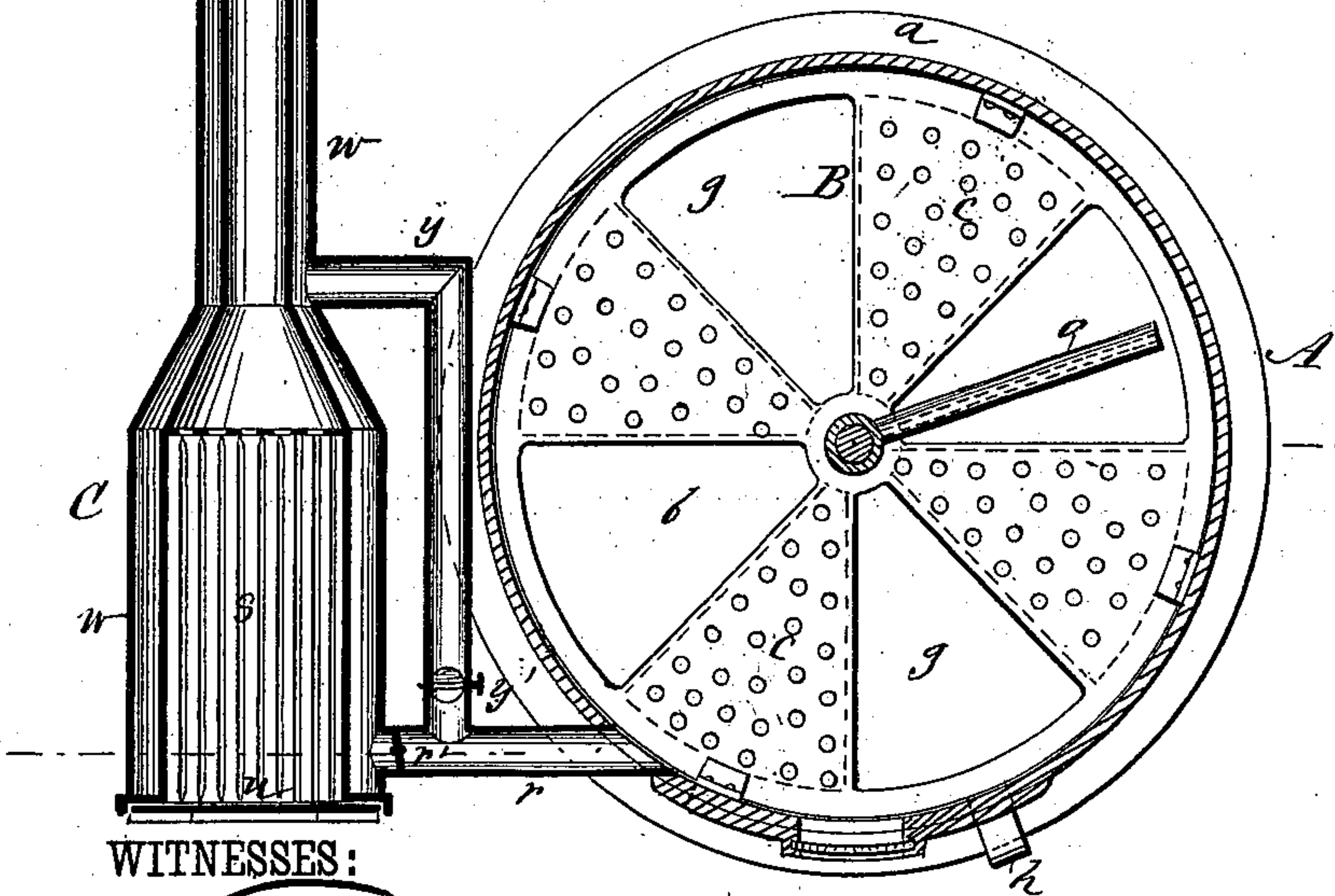


Fig. 4



WITNESSES:

*C. Neveux*  
*C. Sedgwick*

INVENTOR:

*S. Beaven*

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ATTORNEYS.

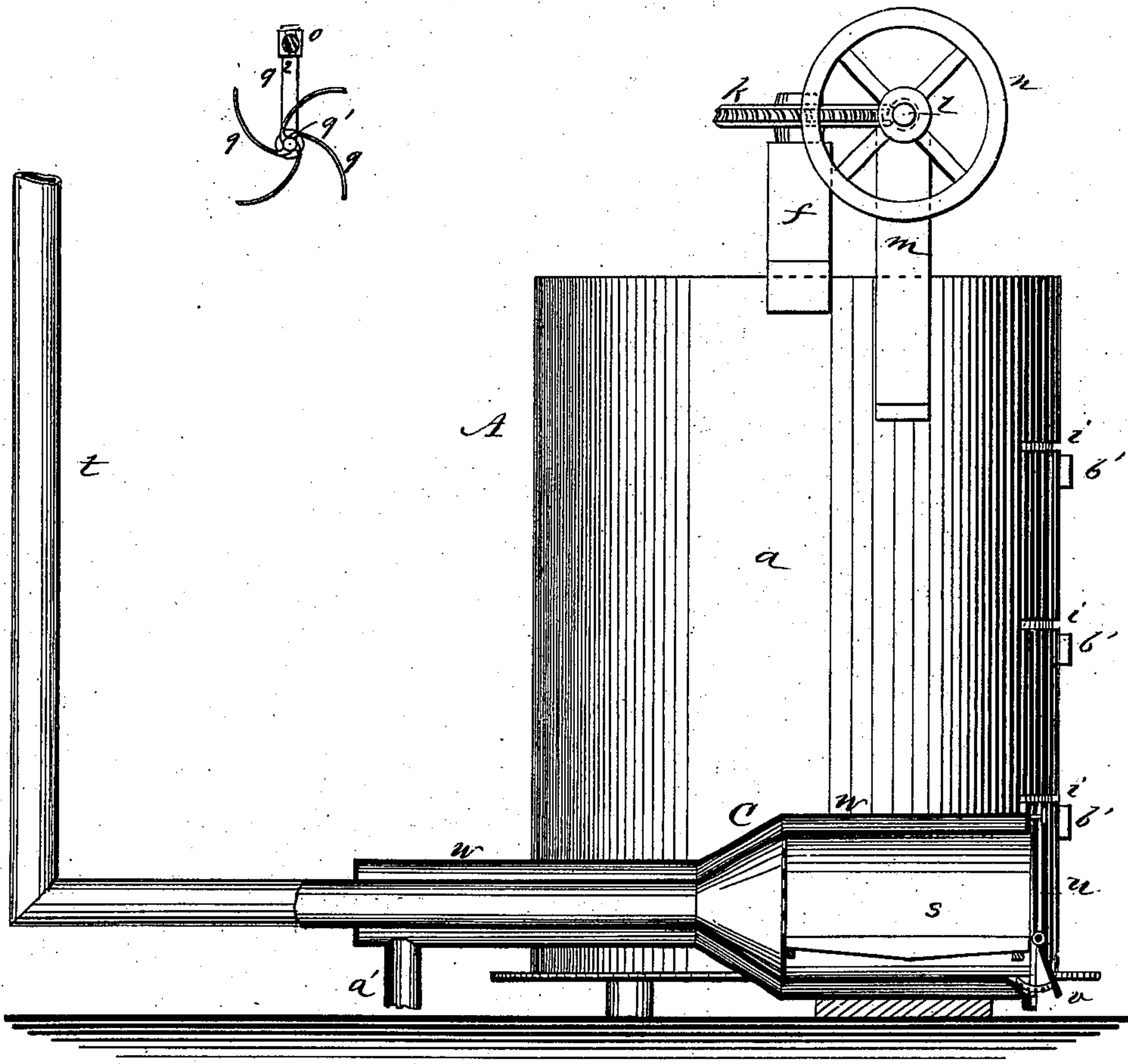
S. BEAVEN.  
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Fig. 6

Fig. 5



WITNESSES:

C. Neveu  
C. Sedgwick

INVENTOR:

S. Beaven

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# UNITED STATES PATENT OFFICE.

SAMUEL BEAVEN, OF SAN PAULO, BRAZIL.

## IMPROVEMENT IN DRIERS FOR COFFEE, COCOA, &c.

Specification forming part of Letters Patent No. 209,794, dated November 12, 1878; application filed October 14, 1878.

*To all whom it may concern:*

Be it known that I, SAMUEL BEAVEN, of San Paulo, in Brazil, have invented a new Improved Drier for Coffee, Cocoa, Malt, Grain, Tea, Sugar, &c., of which the following is a specification:

My invention consists in a hollow vertical cylinder, having a number of foraminous trays placed one above the other, upon which the material is placed to dry. Each tray consists of two disks having openings, one disk being fixed and the other fitted to turn, whereby the openings are closed to retain the material or opened to permit it to pass through. The material is stirred by means of revolving rakes fitted upon a central revolving shaft that is turned by connections with suitable power. The drying is effected by means of heated air forced upward through the apparatus by a pressure-blower, the air being heated by passing it through the jacketed space of a furnace, and the amount of air, as well as its temperature, are regulated by plugs and valves.

The invention also consists in certain details of construction, hereinafter set forth.

In the accompanying drawing, Figure 1 is an elevation of my apparatus at the front side. Fig. 2 is a plan view. Fig. 3 is a vertical section. Fig. 4 is a sectional plan on line *xx* of Fig. 3. Fig. 5 is a side elevation with the furnace in section, and Fig. 6 is a cross-section of one of the rakes.

Similar letters of reference indicate corresponding parts.

A represents the drier, of which *a* is the cylinder, preferably of metal, standing vertically upon supports, which permit removal of the material from beneath it when it is discharged, as hereinafter described.

The cylinder *a* is fitted with a series of horizontal trays, B, more or less in number according to the size of the cylinder *a*, upon which trays the material to be dried is placed. Each of the trays B consists of a fixed circular disk, *b*, and a second disk, *c*, resting upon *b*, and fitting loosely upon the central vertical shaft *d*, that is stepped at *e* in the bottom of cylinder *a*, and is supported above cylinder *a* by a bridge-tree, *f*.

The disks *b* and *c* have radial openings *g* at equal distances apart, which may be closed by

turning disk *c* until the solid portions of one disk register with the openings in the other disk, or opened by turning disk *c* until the openings *g* coincide. Each disk *c* is formed with a projection, *h*, which passes through a slit, *i*, in the side of cylinder *a*, and serves as a handle to turn the disk *c*.

The solid portions of disks *c* are perforated with numerous small holes, and, if desired, the disk *b* may be similarly pierced.

The bottom of cylinder *a* is provided with openings *g'*, similarly to disks *b*, and a revolving disk, *c'*, similar to *c*, except that it is not perforated.

The shaft *d* has fixed upon its upper end a pinion, *k*, that meshes with a worm-shaft, *l*, which is fitted horizontally in the standards *m*, and carries a pulley, *n*, for the connection of suitable power for revolving shaft *d*.

Above each tray B is a horizontal arm, *o*, projecting from shaft *d*, and carrying rakes *p*, that move over the surface of trays B as shaft *d* revolves and stir the material which may be on the trays. These rakes *p* may be of any desired character, either as rigid arms, as shown at *p'*, turned at an angle to throw the material to or from the center, or as curved arms *q* (see Fig. 6) upon an arbor fitted to turn in a bearing, *q<sup>1</sup>*, and also to turn horizontally with a pin, *q<sup>2</sup>*, in the arm *o*, so as to obtain a compound motion of the rake.

The heated air for drying the material on trays B is admitted by a pipe, *r*, through the side of cylinder *a*, as shown, or through the bottom.

C is the furnace for heating the air to the desired temperature, which furnace is shown as placed in a horizontal position at one side of the drier; but it may stand vertically.

*s* is the fire-box of the furnace; *t*, the smoke-pipe; *u*, the door for supplying fuel, and *v* the door of the ash-pit. This furnace is surrounded by a jacket, *w*, that also covers a portion of smoke-pipe *t*, and forming an air-space.

*y* is a pipe from the jacket around pipe *t*, leading to pipe *r*, which pipe *r* also communicates with the jacket *w* around the furnace. *r'* is a damper in pipe *r*, and *y'* is a damper in pipe *y*.

*a'* is a pipe entering the jacket *w*, where it covers smoke-pipe *t*, which pipe *a'* is for sup-



plying air from a blower, (not shown,) and a valve or damper (not shown) will be placed in pipe  $a'$  to regulate the quantity of air admitted.

By connecting the pipe  $a'$  at the point shown the cold air first comes in contact with the pipe  $t$ , and is finally heated to the highest point by the furnace, thus economizing all the heat, and also permitting the use of air of low or high temperature, the air taken by pipe  $y$  being slightly heated, while the air taken directly from the space around the furnace is heated to a high point. The dampers  $r'$  and  $y'$  permit the regulation of the blast, so that it may be taken in either manner.

In using the above-described apparatus for coffee, I use air heated to a temperature of from  $120^{\circ}$  to  $160^{\circ}$  Fahrenheit as being most advantageous for the purpose. It is possible to use a higher degree of heat without affecting the aromatic qualities of the berry; but there will, in that case, be danger of rendering the coffee too dry by extracting too much moisture, it being necessary to retain about thirteen per cent. of moisture in the berry.

By my apparatus, using air heated to the proper point, fermentation, germination, and decay are prevented or arrested, and the heat can be regulated according to the condition and quality of the coffee.

The fresh or green coffee is first placed on the upper tray, B, and after remaining there about half an hour the disk  $c$  will be opened to permit the charge to fall to the second tray, and a fresh charge is put on the upper tray, and the operation continued until the first charge is discharged at the openings  $g'$ , when all the trays will be charged. The discharge will then be made at regular intervals and in succession from one tray to the other. By this means the berries that are green are first subjected to the mildest heat, the air being tempered by its previous passage through the trays below, while the more completely dried coffee is acted upon by the less humid air at a higher temperature, necessary to extract the moisture from the center of the berry.

I insert in openings in the sides of cylinder  $a$ , above each tray B, a small piece of glass, as seen at  $b'$ , through which the operation may be observed, and I also place thermometers in the side of  $a$  to indicate the temperature. There is to be a connection from the jacketed space around the furnace, leading beneath or over the fire, for the purpose of giving a blast to the fire when necessary.

The above-described apparatus is especially designed for drying coffee, and has been described in that connection, because the proper drying of coffee presents more difficulties than most other substances. The apparatus may, however, be used for drying other substances, such as hops, grain, fruit, &c.; and with some substances the rakes may not be needed.

I claim—

1. The combination of a jacketed furnace, a blower, and a drier, the latter being provided with two air-supply pipes, the one connected to the furnace near to and the other remote from the body of the stove, whereby hot air of different temperatures may be forced into the drier, as shown and described.

2. A drier provided with horizontal foraminous trays B, consisting of one fixed and one loose disk, arranged to operate as and for the purpose specified.

3. The combination, with the drying apparatus A and jacketed furnace C, of the pipes  $r$  and  $y$  and dampers  $r'$   $y'$ , arranged substantially as and for the purposes set forth.

4. In combination with the cylinder  $a$  of a drying apparatus, the foraminous trays B, consisting of a fixed disk,  $b$ , and loose disk  $c$ , provided with openings  $g$ , and arranged for operation substantially as and for the purposes described.

Signed this 4th day of November, 1877.

SAMUEL BEAVEN.

In presence of—

RICHARD GRAY,  
ALLEN BAGGOTT.