

(No Model.)

2 Sheets—Sheet 1.

G. F. ROBINSON.  
DRIER.

No. 256,503.

Patented Apr. 18, 1882.

Fig. 2.

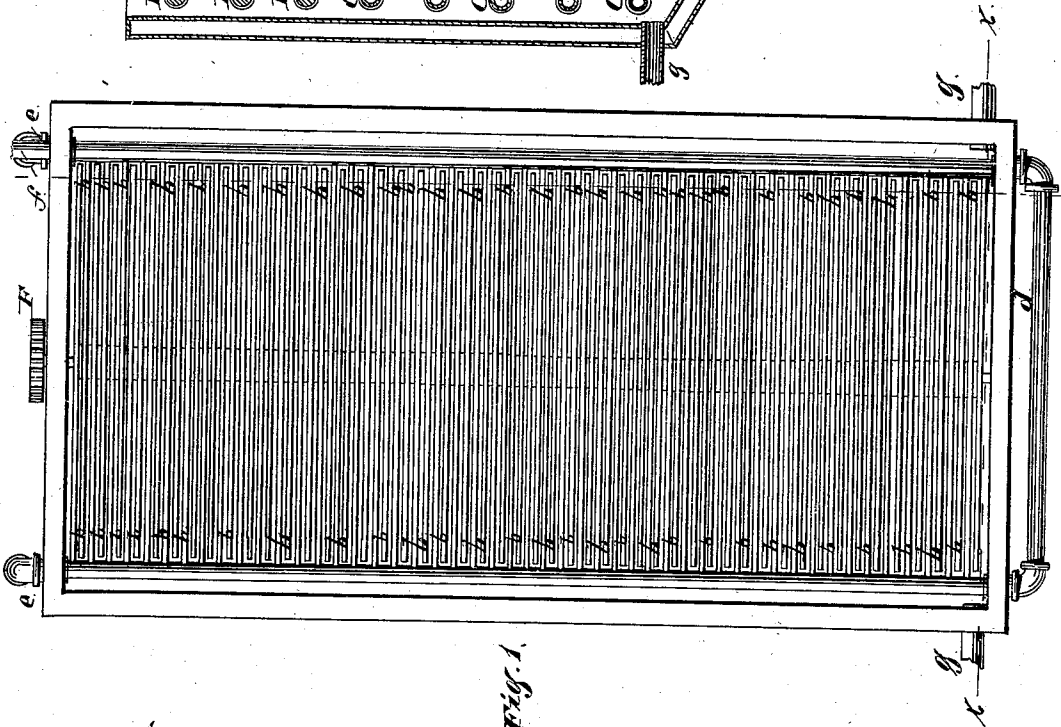
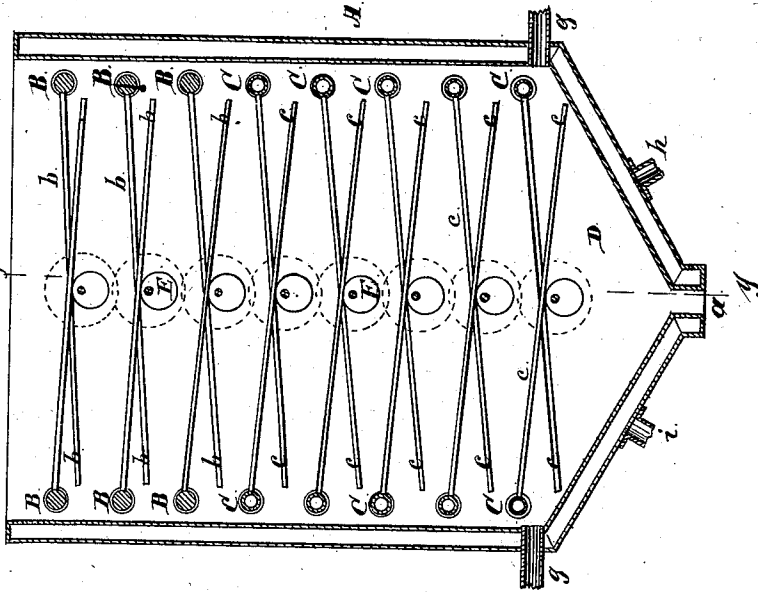


Fig. 1.

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Edgar D. Bond

Inventor:  
George F. Robinson.  
By West & Bond.  
His Atty.

(No Model.)

2 Sheets—Sheet 2.

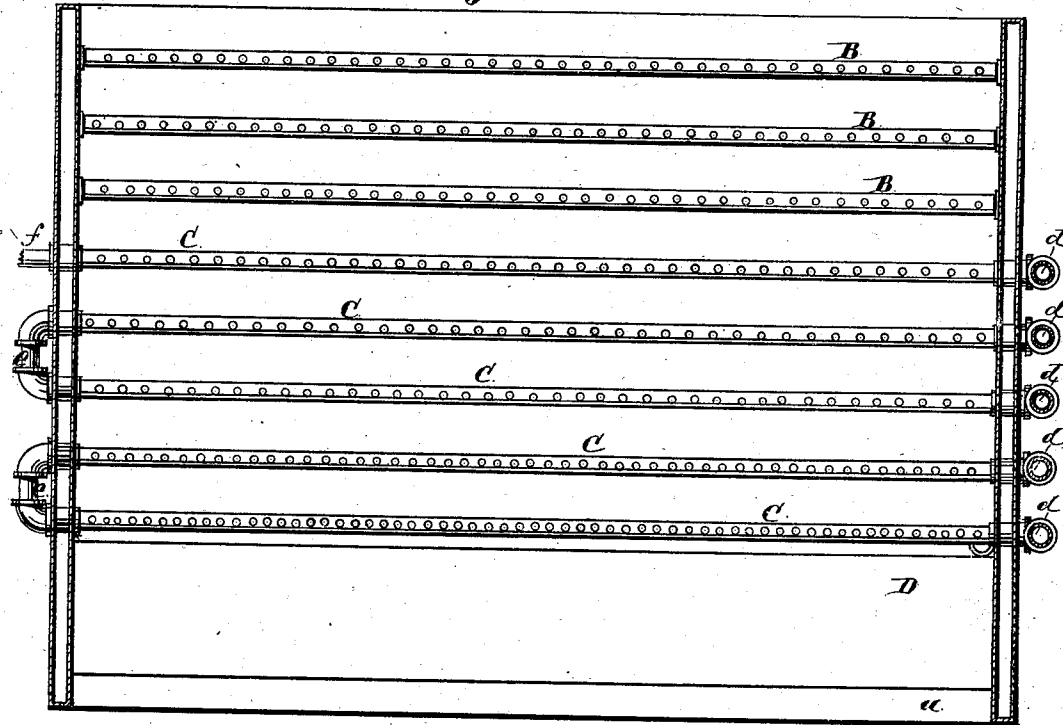
G. F. ROBINSON.

DRIER.

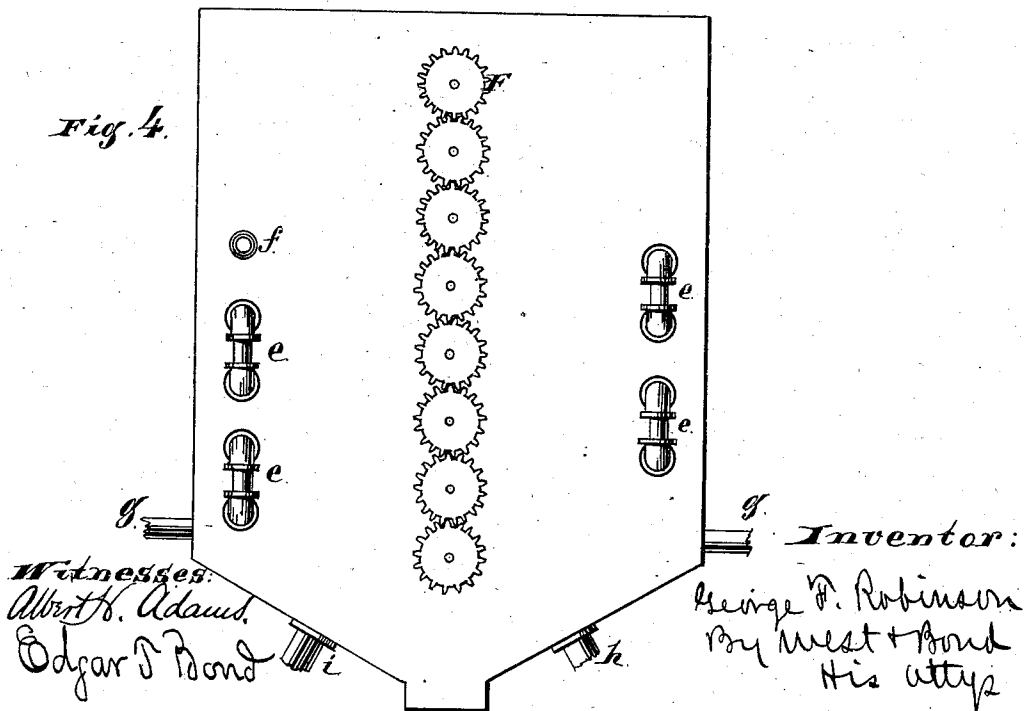
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*Fig. 3.*



*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

GEORGE F. ROBINSON, OF CHICAGO, ILLINOIS.

## DRIER.

SPECIFICATION forming part of Letters Patent No. 256,503, dated April 18, 1882.

Application filed January 3, 1882. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. ROBINSON, residing at Chicago, in the county of Cook and State of Illinois, and a citizen of the United States, have invented new and useful Improvements in Driers, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a top view. Fig. 2 is a vertical cross-section at line *x* of Fig. 1. Fig. 3 is a vertical longitudinal section taken at line *y* of Fig. 2, looking to the right, showing the shafts B C, with holes therein for the arms *b c*, which, to prevent confusion, are not shown. Fig. 4 is an elevation showing one end.

The object of my invention is to provide for effectually and rapidly drying semi-fluid matter—such as distillers' slop and glucose refuse—and also grain and other things.

My invention consists essentially in the combination, with a drying-chamber, of a series of rocking shafts provided with arms, arranged in the manner hereinafter described, whereby the material to be dried will by the movement of the shafts and arms be agitated and fed.

The invention also consists in the combination, with a drying-chamber, of a series of rocking hollow shafts provided with tubes or arms and connecting-tubes, for the purpose of permitting a circulation of steam through the tubes and agitating the material while being dried.

The invention embraces other features, all of which will be fully hereinafter described in detail, and specifically set forth in the claims.

In the drawings, A represents a case the walls of which are double, the chamber within the inner wall being, for ordinary purposes, about fourteen feet long, seven feet wide, and of any suitable height—say from twelve to sixteen feet, or more. This chamber is open at the top; but the space between the two walls is covered. The bottom of the case and chamber is inclined, and at the bottom of the incline is an opening, *a*, extending the length of the chamber, through which the dried material can be discharged into a suitable conveyer, which is not shown.

The case may be located in any suitable part of a building, and is to be supported at a suit-

able distance above the floor in any suitable manner.

B are shafts, which are supported in bearings in the end walls of the case A, so that they have a partial rotary motion.

C are tubes about three inches in diameter. They are supported also in bearings in the end walls of the case A, and also can have a partial rotary motion. The ends of these tubes C project a little beyond the outer walls of the ends of the case A. I place a number of these shafts B above the tubes C, on each side of the chamber D, within the case A, as shown in Fig. 2.

*b* are a number of arms, one end of which is secured in a shaft, B, the other end being free.

*c* are other arms similar to the arms *b*, except that they, *c*, are tubes, the free ends of which are closed, the other end being properly secured in one of the tubes C. The arms and tubes *b c* upon one side of the chamber pass in between the arms and tubes *b c* upon the opposite side. The arms *b* may be about one-fourth of an inch apart, or the distance may be greater if necessary, while the arms or tubes *c* may be nearer together. The ends of the tubes C are connected at one end of the case by horizontal tubes *d*, and at the opposite end by short vertical tubes *e*, the connections being such as not to interfere with the partial rotation of such tubes C; and also such that steam being admitted to one of the tubes C—for example, at *f*—can circulate through all the tubes C, and also through the connections *d e*. Steam can also pass from the tubes C into the small tubes *e*.

Beneath each double series of arms *b* and tubes *c*, I place a shaft, E, upon which such arms *b* and *c* rest. These shafts E are to be either eccentrically supported or eccentric in form, and by their rotation a slight movement will be given to the arms *b c*, their free ends rising a little above and falling a little below the horizontal. These shafts E may be driven in any suitable manner—for example, by means of gear wheels, one of which, F, is shown.

In use it will be desirable to have the devices which operate the shafts E so adjusted that some one or more of such shafts E can be at rest while the others are rotating. These

devices I do not show, but any skilled mechanic can construct them.

*g* are inlets for hot air, which may be driven through the chambers D while the drying process is going on.

*h* is an inlet for steam into the space between the two walls of the chamber D.

*i* is the outlet for such steam.

In use I admit steam between the walls of the case and maintain a circulation of steam through the pipes C, and also force hot air into the chamber D.

The operation is as follows: The material to be dried is to be delivered or placed upon the upper surfaces of the upper tier or series of arms, *b*, from which it will fall onto the several series of arms *b c*, one after another, passing gradually from the top to the bottom, being thoroughly dried by the hot air and by the heat from the steam. While the drying process is going on the shafts E should be rotated for the purpose of agitating the material and causing it to fall from one series of arms to another; but if the devices which drive these shafts E are properly constructed, one or more of these shafts E, either at the top or the bottom, may be stopped. This may be desirable to allow material to accumulate upon the upper series of arms or to arrest its delivery from the lower series. This can be accomplished either by means of loose pulleys or clutch-pinions.

If necessary, suitable supports may be provided for the shafts B and tubes C, and also for the shafts E at or near the center thereof.

The moisture from the dried material may be conducted to the open air in any suitable manner.

The shafts B might be made hollow, the same as the tubes C, and steam could be passed

into them as desired, and the arms *b* might be hollow.

A leading feature of my invention is the series of arms *b c* for receiving, agitating, and delivering the material from one series to another; and the operation of these is the same, whether both steam and hot air be used, as described, or whether steam or hot air only be used for drying.

The parts which have been described as the tubes C are in fact hollow rocking shafts.

As shown in the drawings, the shafts E are round, but are pivoted eccentrically.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. In combination with a drying-chamber, a series of rocking shafts provided with arms, arranged substantially as described, whereby the material to be dried will by the movement of the shafts and arms be agitated and fed, substantially as specified.

2. In combination with a drying-chamber, a series of rocking hollow shafts, C, provided with tubes or arms *c*, arranged substantially as described, and connecting-tubes *d e*, for the purpose of permitting a circulation of steam through the tubes and agitating the material while being dried, substantially as specified.

3. In combination with a drying-chamber, a series of shafts provided with arms, arranged substantially as described, and shafts E, for the purpose of agitating the material being dried, and permitting it to fall from the arms by the movement of such arms, substantially as set forth.

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Witnesses:

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