

No. 840,602.

PATENTED JAN. 8, 1907.

A. BERG.

ROTARY DRIER.

APPLICATION FILED FEB. 3, 1906.

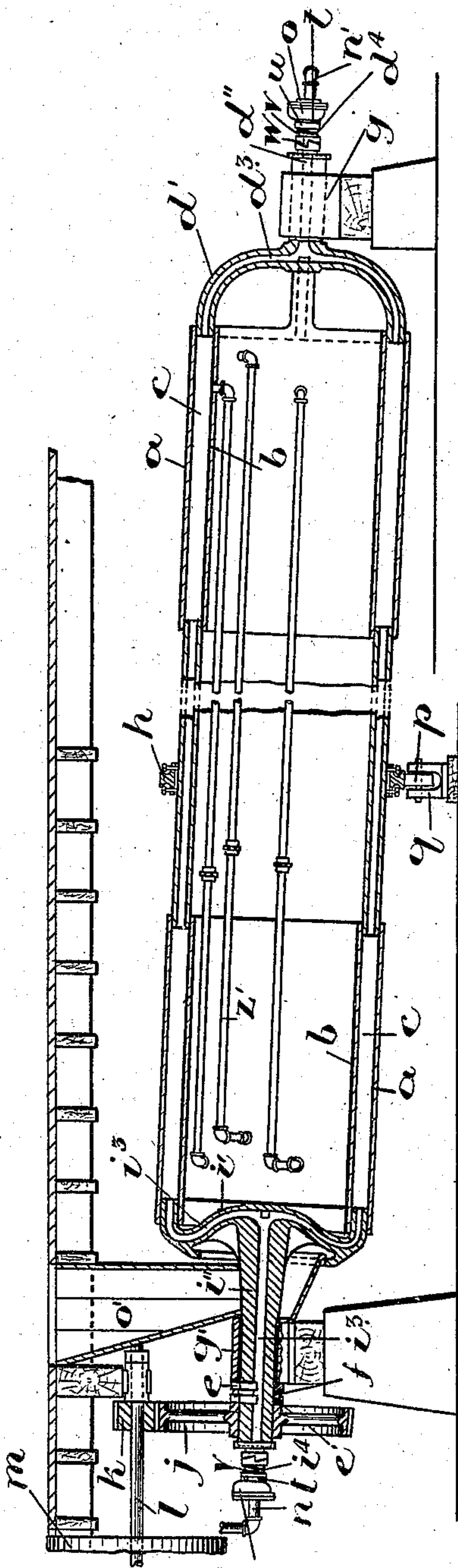


Fig. 1.

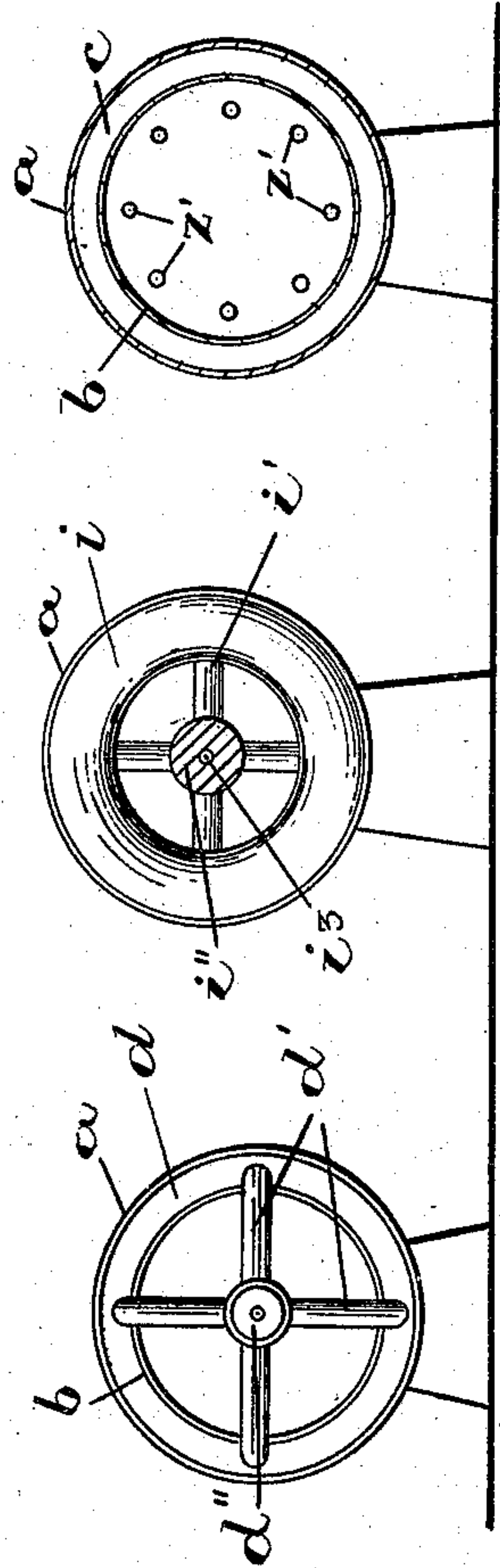


Fig. 10a.

Fig. 2.

Fig. 3.

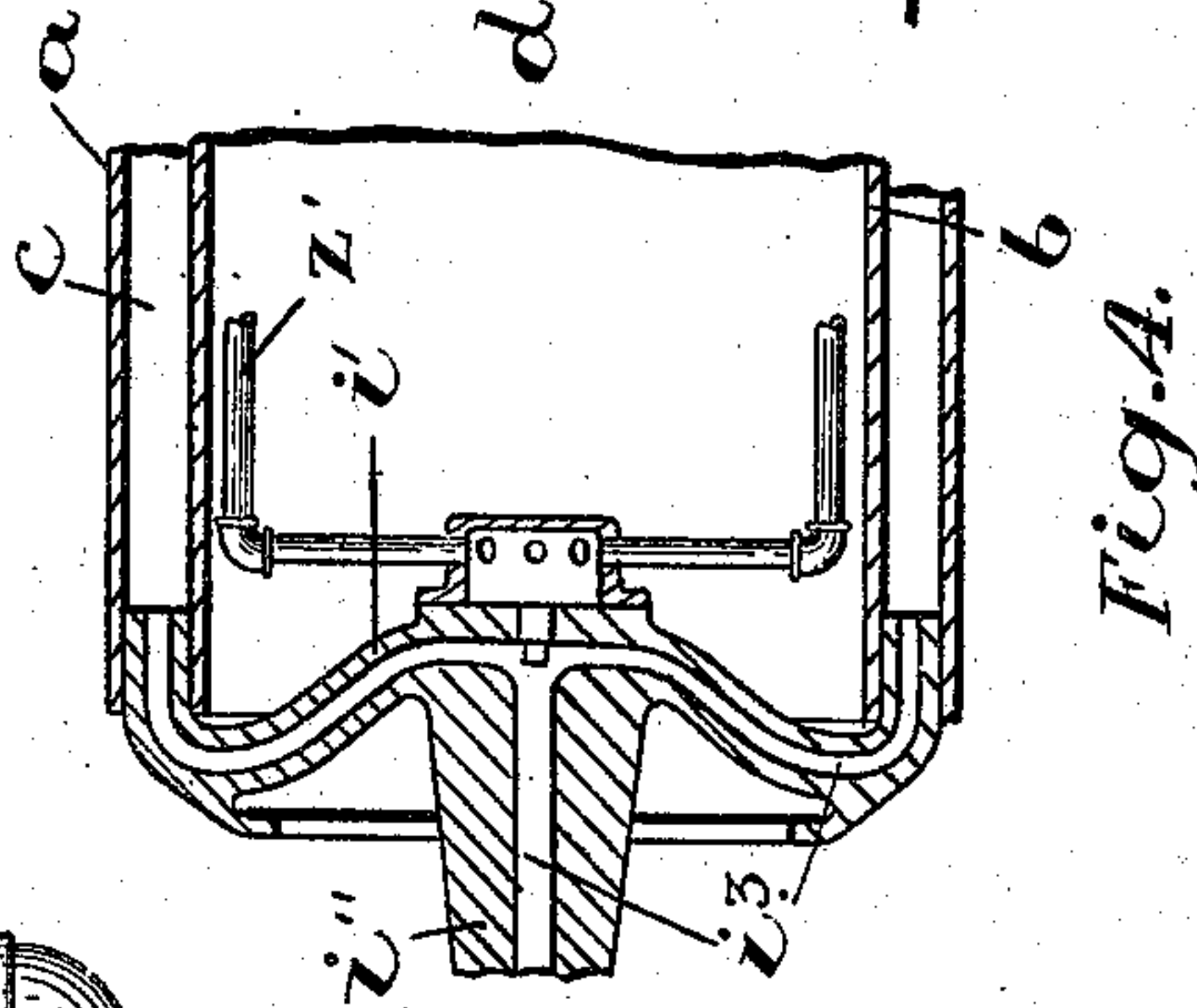


Fig. 4.

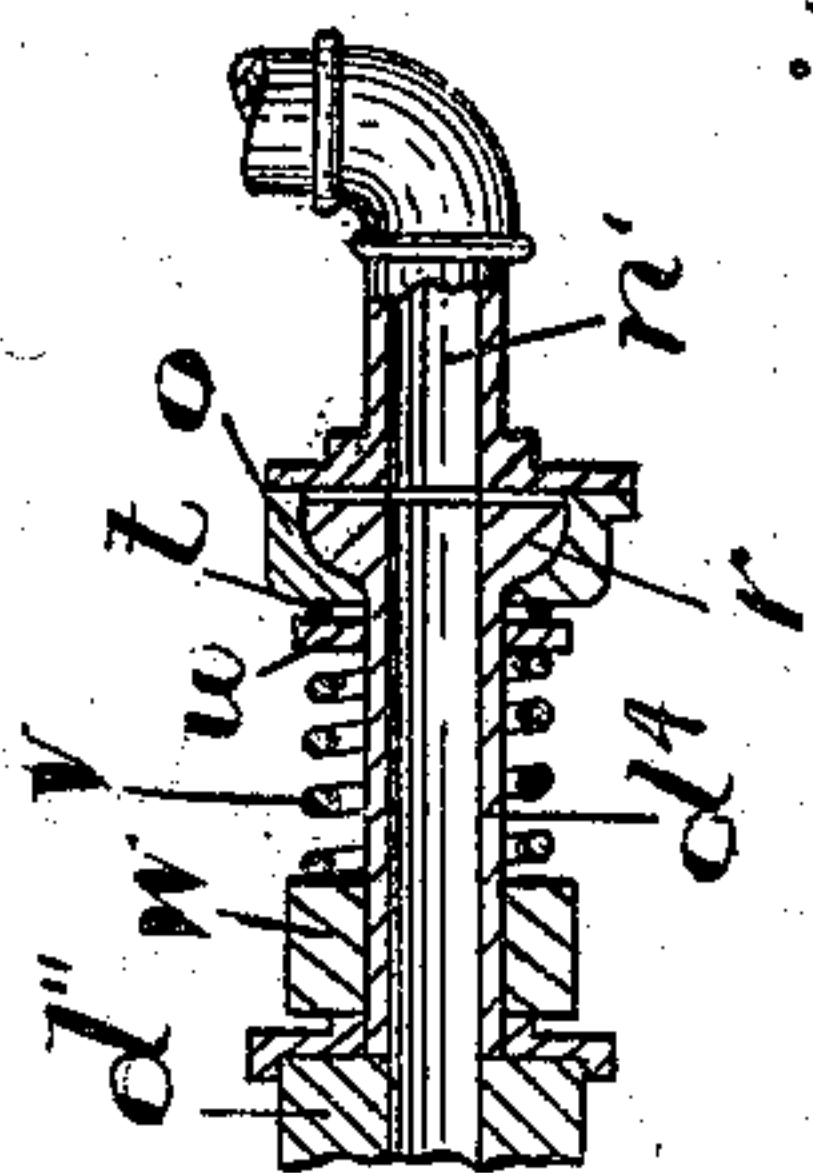


Fig. 5.

Witnesses.
H. L. Trimble,
C. Sheffield

Inventor.
Anton Berg
by C. R. Riches
his attorney.

UNITED STATES PATENT OFFICE.

ANTON BERG, OF ANDERSON, INDIANA.

ROTARY DRIER.

No. 840,602.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed February 3, 1906. Serial No. 299,282.

To all whom it may concern:

Be it known that I, ANTON BERG, a citizen of the United States, and a resident of Anderson, in the county of Madison, in the State of Indiana, one of the United States of America, now residing at the city of Toronto, in the county of York and Province of Ontario, Canada, have made certain new and useful Improvements in Rotary Driers; and I hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to a rotary drier comprising a tubular drying-cylinder inclosed by a steam-jacket and having journals mounted to revolve in suitable bearings, a feeding mechanism arranged to deliver the material to be dried into the drying-cylinder as it revolves, means for supplying steam to the steam-space between the steam-jacket and drying-cylinder and exhausting it therefrom, radiator-pipes within the drying-cylinder and connected with the steam-space, and means for imparting a rotary motion to the drier, the whole being constructed, arranged, and operated as hereinafter more fully set forth, and illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section, and Fig. 1^a is a transverse section, of the apparatus. Figs. 2 and 3 are end elevations of the same. Fig. 4 is a sectional view of an alternative means for connecting the radiator-pipes with the steam-space. Fig. 5 is a sectional view of one of the couplings for the steam-pipes and journals.

Like letters of reference refer to like parts throughout the specification and drawings.

Contained within the steam-jacket *a* is a tubular drying-cylinder *b*, and formed between them is a steam-space *c*. Closing the ends of the steam-space *c* are annular plates *d* and *i*, having radial arms *d'* and *i'*, terminating in centrally-located journals *d''* and *i''*, through which and the radial arms are formed steam-passages *d³* and *i³* to communicate with the steam-space *c*. The journals *d''* and *i''* are mounted to revolve in suitable bearings *g* and *g'*, and fixed upon the journal *i''* is a gear-wheel *j*, which meshes with a pinion-wheel *k*, fixed upon the counter-shaft *l*, driven by a pulley *m*. The ends of the journals *i''* and *d''* are revolubly connected with the adjacent ends of the stationary steam

and exhaust pipes *n* and *n'*, so that the steam may flow from the steam-pipe *n* through the steam-passage *i³* into the steam-space *c* and then out through the steam-passage *d³* to the exhaust-pipe *n'* to heat the drying-cylinder *b*. To prevent the escape of the steam at the joints between the ends of the journals and the steam and exhaust pipes, the pipes *n* and *n'* have semispherical collars or sockets *o* to revolubly inclose the correspondingly-shaped enlargements or balls *r*, fitted on the extensions *d⁴* *i⁴* of the journals *d''* and *i''*. Movably mounted upon the extensions *d⁴* *i⁴* of the journals *d''* and *i''* are collars *u*, opposed to the adjacent ends of the semispherical collars, and interposed between and contacting the collars *o* and *u* are antifriction-balls *t*. Fixed upon the extensions *d⁴* and *i⁴* are collars *w*, and bearing against the collars *w* and *u* are compression-springs *v*, which forcibly press the movable collars *u* toward the coupling-collars *o* to hold the inner faces of the coupling-collars *o* tightly against the spherical enlargements of the steam and exhaust pipes and prevent the escape of the steam at those joints. At the receiving end of the drying-cylinder *b* is a feed-box *o'* to deliver the material to be dried into the cylinder. The radial arms *i'* at one end of the drier are inwardly curved to allow the feed-box to project slightly into the drying-cylinder, so that the material may be delivered directly into it, and the radial arms *d'* at the opposite ends of the drier are outwardly curved to allow of the unobstructed delivery of the dried material from the drying-cylinder when it reaches its delivery end.

The drier has a downward inclination from the receiving to the delivery end, and owing to this inclination the bearing *g* at the delivery end of the drier will be subject to a greater or less amount of end thrust. To compensate for the end thrust, the journal *i''* has a fixed annular shoulder *e'*, and encircling the journal *i''* between the shoulder *e'* and the adjacent bearing *g'* is a thrust-ring *e*, and interposed between the thrust-ring *e* and the shoulder *e'* are antifriction-balls *f*. Encircling the steam-jacket *a* is an annular bearing-ring *h*, revolubly contacting an idler *p*, mounted to revolve in a bearing *q*. Contained within the drying-cylinder are radiator-pipes *z'*, connected with the steam-space

c of the jacket, as shown in Fig. 1, or with the steam-channels $i^3 d^3$ of the radial arms, as shown in Fig. 4. These radiator-pipes are in constant contact with the contents of the drying-cylinder as the latter revolves and directly transmit their heat units to the material therein. Motion is transmitted by the pinion *k* from the counter-shaft *l* to the gear-wheel *j*, which is fixed upon the journal i'' to cause the revolution of the journal and the drying-cylinder. The steam circulates from the steam-pipe *n* through the steam-passage i^3 into the steam-space *c*, from which it passes through the steam-passages d^3 to the exhaust-pipe n' , and during its circulation through the steam-space heats the drying-cylinder *b*, so that the radiated heat units can be employed for drying the material therein. The material to be dried passes through the feed-box *o'* and is discharged from the feed-box into the receiving end of the drying-cylinder. The revolution of the drying-cylinder *b* agitates the material, so that it will readily absorb the heat units radiated from the surface of the drying-cylinder and the radiator-pipes as it gradually moves toward the delivery end of the same, from which it is discharged through the radial arms d' into the receptacles placed to receive it.

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

1. In a rotary drier the combination of the drying-cylinder, a steam-jacket inclosing the drying-cylinder, annular end plates closing the ends of the steam-space between the drying-cylinder and steam-jacket, radial arms for the end plates having centrally-located journals with steam-passages, through the journals, arms and end plates, communicating with the steam-space, steam and exhaust pipes communicating with said steam-passages, means for revolubly coupling the journals to the steam and exhaust pipes and means for revolving the drier.

2. In a rotary drier the combination of the drying-cylinder, a steam-jacket inclosing the drying-cylinder, annular end plates closing the ends of the steam-space between the drying-cylinder and steam-jacket, radial arms for the end plates having centrally-located journals with steam-passages, through the journals, arms and end plates, communicating with the steam-space, steam and exhaust pipes communicating with said steam-passages, means for revolubly coupling the journals to the steam and exhaust pipes comprising spherical coupling-collars on the steam and exhaust pipes and spherical enlargements for extensions of the ends of the journals revolubly contained in the coupling-collars and means for revolving the drier.

3. In a rotary drier the combination of the drying-cylinder, a steam-jacket inclosing the

drying-cylinder, annular end plates closing the ends of the steam-space between the drying-cylinder and steam-jacket, radial arms for the end plates having centrally-located journals with steam-passages, through the journals, arms and end plates, communicating with the steam-space, steam and exhaust pipes communicating with said steam-passages, means for revolubly coupling the journals to the steam and exhaust pipes comprising spherical coupling-collars on the steam and exhaust pipes, spherical enlargements for the extension of the ends of the journals revolubly contained in the coupling-collars, movable collars loosely encircling the extensions and stationary collars fixed thereto, compression-springs interposed between the movable and stationary collars and means for causing the revolution of the drier.

4. In a rotary drier the combination of the drying-cylinder, a steam-jacket inclosing the drying-cylinder, annular end plates closing the ends of the steam-space between the drying-cylinder and steam-jacket, radial arms for the end plates having centrally-located journals with steam-passages, through the journals, arms and end plates, communicating with the steam-space, steam and exhaust pipes communicating with said steam-passages, means for revolubly coupling the journals to the steam and exhaust pipes, comprising coupling-collars on the steam and exhaust pipes, spherical enlargements for the extensions of the ends of the journals revolubly contained in the coupling-collars, movable collars loosely encircling the extensions and stationary collars fixed thereto, compression-springs interposed between the movable and stationary collars, antifriction-balls interposed between the movable and coupling collars, and means for causing the revolution of the drier.

5. In a rotary drier the combination of the drying-cylinder, a steam-jacket inclosing the drying-cylinder, annular end plates closing the ends of the steam-space between the drying-cylinder and steam-jacket, radial arms for the end plates having centrally-located journals with steam-passages, through the journals, arms and end plates communicating with the steam-space, steam and exhaust pipes communicating with the steam-passages, means for revolubly coupling the journals to the steam and exhaust pipes comprising coupling-collars on the steam and exhaust pipes, spherical enlargements for the extensions of the ends of the journals revolubly contained in the coupling-collars, movable collars loosely encircling the extensions and stationary collars fixed thereto, compression-springs interposed between the movable and stationary collars, antifriction-balls interposed between the movable and coupling collars, means for causing the revolution of

the drier, a fixed shoulder for the journal at the receiving end of the drier, a thrust-ring interposed between the shoulder and adjacent bearing, antifriction-balls interposed between the shoulder and thrust-ring and means for causing the revolution of the drier.

6. In a rotary drier the combination of the drying-cylinder, a steam-jacket inclosing the drying-cylinder, annular end plates closing the ends of the steam-space between the drying-cylinder and steam-jacket, radial arms for the end plates having centrally-located journals with steam-passages, through the journals, arms and end plates, communicating with the steam-space, steam and exhaust pipes communicating with said steam-passages, means for revolubly coupling the journals to the steam and exhaust pipes, means for revolving the drier, and a feed-box at the receiving end of the drying-cylinder to deliver the material into the drying-cylinder.

7. In a rotary drier the combination of the drying-cylinder, a steam-jacket inclosing the drying-cylinder, annular end plates closing the ends of the steam-space between the drying-cylinder and steam-jacket, radial arms for the end plates having centrally-located journals with steam-passages, through the journals, arms and end plates, communicating with the steam-space, steam and exhaust pipes communicating with the steam-passages, means for revolubly coupling the journals to the steam and exhaust pipes comprising spherical coupling-collars on the steam and exhaust pipes, spherical enlargements for extensions of the ends of the journals revolubly contained in the coupling-collars, means for revolving the drier, and a feed-box at the receiving end of the drying-cylinder.

8. In a rotary drier the combination of the drying-cylinder, a steam-jacket inclosing the drying-cylinder, annular end plates closing the ends of the steam-space between the drying-cylinder and steam-jacket, radial arms for the end plates having centrally-located journals with steam-passages through the journals, arms and end plates communicating with the steam-space, steam and exhaust pipes communicating with said steam-passages, means for revolubly coupling the journals to the steam and exhaust pipes comprising coupling-collars on the steam and exhaust pipes, spherical enlargements for the extensions of the ends of the journals revolubly contained in the coupling-collars, movable collars loosely encircling the extensions and stationary collars fixed thereto, compression-springs interposed between the movable and stationary collars, means for causing the revolution of the drier, and a feed-box at the receiving end of the drying-cylinder.

9. In a rotary drier the combination of the drying-cylinder, a steam-jacket inclosing the

drying-cylinder, annular end plates closing the ends of the steam-space between the drying-cylinder and steam-jacket, radial arms for the end plates having centrally-located journals with steam-passages, through the journals, arms and end plates, communicating with the steam-space, steam and exhaust pipes communicating with said steam-passages, means for revolubly coupling the journals to the steam and exhaust pipes comprising coupling-collars on the steam and exhaust pipes, spherical enlargements for the extensions of the ends of the journals revolubly contained in the coupling-collars, movable collars loosely encircling the extensions and stationary collars fixed thereto, compression-springs interposed between the movable and stationary collars, means for causing the revolution of the drier, antifriction-balls interposed between the movable and coupling collars, and a feed-box at the receiving end of the drying-cylinder.

10. In a rotary drier, the combination of the drying-cylinder, a steam-jacket inclosing the drying-cylinder, annular end plates closing the ends of the steam-space between the drying-cylinder and steam-jacket, radial arms for the end plates having centrally-located journals with steam-passages through the journals, arms and end plates, communicating with the steam-space, steam and exhaust pipes communicating with the steam-passages, means for revolubly coupling the journals to the steam and exhaust pipes comprising coupling-collars on the steam and exhaust pipes, spherical enlargements for the extensions of the ends of the journals revolubly contained in the coupling-collars, movable collars loosely encircling the extensions and stationary collars fixed thereto, compression-springs interposed between the movable and stationary collars, antifriction-balls interposed between the movable and coupling collars, means for causing the revolution of the drier, a fixed shoulder for the journal at the receiving end of the drier, a thrust-ring interposed between the shoulder and adjacent bearing, antifriction-balls interposed between the shoulder and thrust-ring, and a feed-box at the receiving end of the drying-cylinder.

11. A rotary drier comprising an inner casing, an outer casing inclosing the inner casing to form a steam-space between them, plates connected to the inner and outer casings to close the ends of the steam-space, hollow arms connected with the plate at one end of the drier and curved inwardly into the inner casing, a hollow journal connected with the arms and projecting beyond the adjacent end of said casing, hollow arms connected with the plate at the other end of the drier and curved outwardly therefrom, and a hollow journal connected with last-mentioned arms.

12. A rotary drier comprising a drying-
cylinder composed of an inner casing having
both its ends open, an outer casing inclosing
the inner casing with an unoccupied space
5 between the outer and inner casings, end
plates connected to the inner and outer cas-
ings to close the ends of said space, journals
for the drying-cylinder having steam-pas-
sages therethrough, hollow arms with steam-

passages therein connected with the journals, 10
and said space between the inner and outer
casings, and steam-pipes within the cylinder
connected with the steam-space.

Toronto, January 26, A. D. 1906.

ANTON BERG.

In presence of—

C. H. RICHES,

L. F. BROCK.