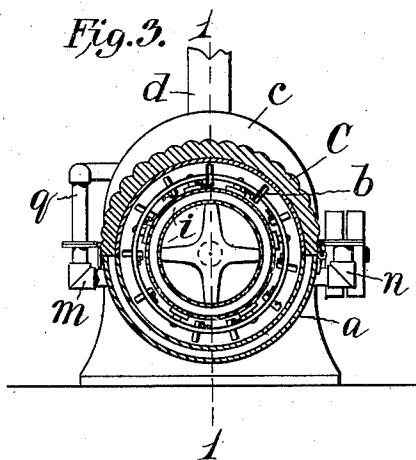
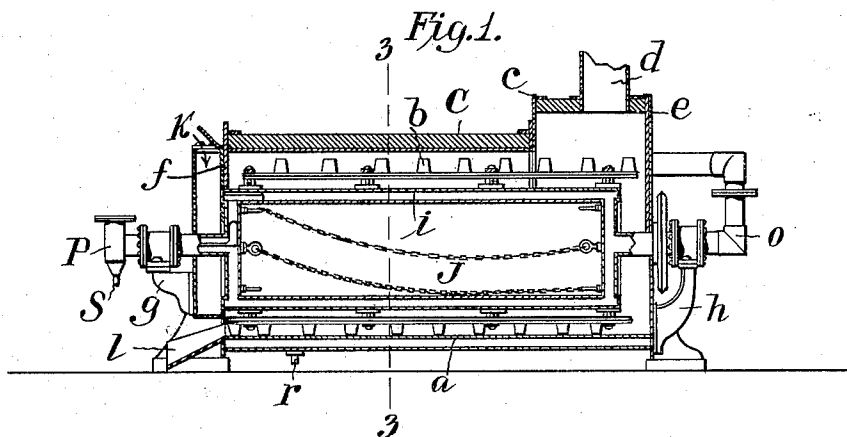
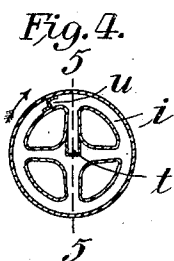
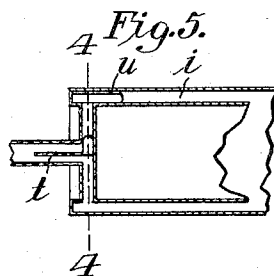


M. HECKING.
 DRYING APPARATUS.
 APPLICATION FILED SEPT. 6, 1900.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses
 Edgeworth *Edgeworth*
 Theodore J. Dornau

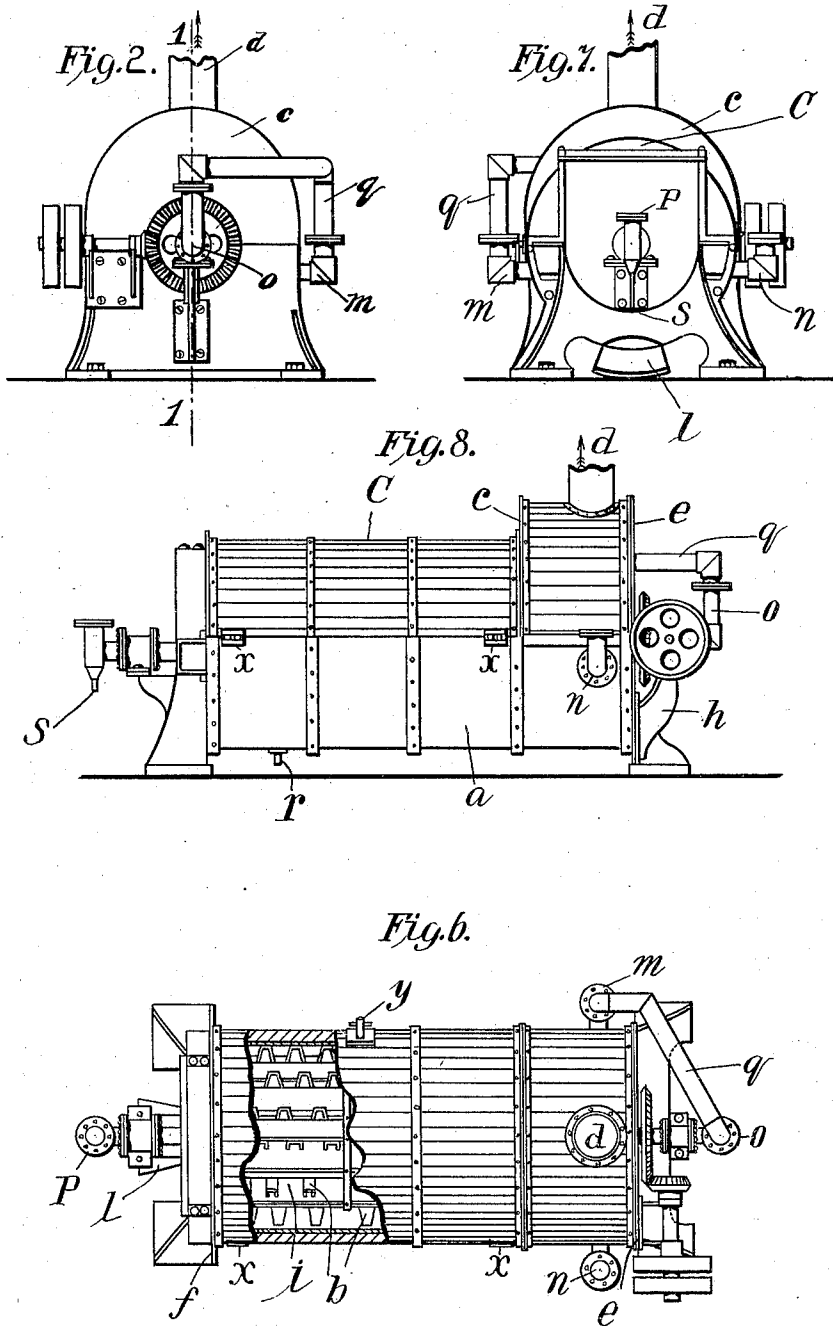
Inventor
 Max Hecking
 By *Edis* Attorneys
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2 SHEETS—SHEET 2.



Witnesses
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Theodore J. Dorman

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UNITED STATES PATENT OFFICE.

MAX HECKING, OF DORTMUND, GERMANY, ASSIGNOR TO ADOLPHUS BUSCH, OF ST. LOUIS, MISSOURI.

DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 738,800, dated September 15, 1903.

Application filed September 6, 1900. Serial No. 29,140. (No model.)

To all whom it may concern:

Be it known that I, MAX HECKING, a subject of the German Emperor, residing at Dortmund, Germany, have invented new and useful Improvements in Drying Apparatus, of which the following is a specification.

The object of my invention is to provide a new and improved drying apparatus which shall be of simpler construction, more conveniently operated, and more effective in its action than those hitherto employed.

In the accompanying drawings, Figure 1 is a vertical longitudinal partial sectional view of my drying apparatus, the section being taken on the line 1 1 of Figs. 2 and 3. Fig. 2 is an end view of the drier as seen from the right, Fig. 1. Fig. 3 is a vertical transverse sectional view of the drum on the line 3 3 of Fig. 1. Fig. 4 is a detail transverse sectional view of the steam-jacket discharge end of the drum, the section being taken on the line 4 4 of Fig. 5. Fig. 5 is a detail longitudinal sectional view of the same end of the drum on the line 5 5 of Fig. 4 looking at the left-hand portion, the right-hand portion being removed. Fig. 6 is a plan view of the drying apparatus, the cover being partly broken away to show the shovels. Fig. 7 is an end view of the drier as seen from the left, Fig. 1. Fig. 8 is a side elevation of the drier corresponding to Fig. 1.

Similar letters indicate similar parts throughout the several views.

The apparatus consists of a stationary cylindrical drum or trough *a*, which has a steam-jacket. The trough has a cover, the part *C* being removable by swinging on the hinges *x*, the handle *y* serving to secure the cover when closed. The part *c* of the cover is not removable and is elevated and serves as a collecting-space for the generated steam, which is drawn off through *d* in the direction of the arrow. Tightly secured to the trough *a* at either end are the cast-iron front walls *e* and *f*.

The front walls *e* and *f* carry cast-iron brackets *h* and *g*, respectively, on which rest stuffing-boxes in which lie the hollow end journals of the rotatable inner drum *i* of the apparatus. This drum, as seen from Figs. 4 and 5, has likewise a steam-jacket, which is in communication through the hollow arms

of the spiders attached to the end journals with the inlet and outlet pipes for steam or other heating medium. The rotatable drum *i* carries on its circumference a number of bars supporting shovels *b*. The shovels *b* are spirally arranged (see Fig. 6) and serve to lift up and forward the material to be dried.

In the inner drum there are, as shown, three or more chains *J* so secured that they slip along the bottom, prevent the adhesion thereto of the moist material to be dried, and lift and forward this material continually during the revolution. At the end for charging the material to be dried the drum rotates in a corresponding opening in the front wall *f*, making a tight joint. At the opposite end a space is left between the drum and the front wall *e* wide enough to let the material to be dried fall out of the drum into the concentric outer space. The steam enters through the tube *n*, Fig. 3, into the steam-jacket of the trough. From this it passes through the tube *m* and the pipe connection *q*, Figs. 2, 3, 6, and 8, into the tube *o*, Figs. 2 and 8, passes through the steam-jacket of the inner drum, and escapes at *p* into the open air in so far as it has not been condensed through the loss of heat. The water of condensation of the trough runs off at *r*, Fig. 1, that from the inner drum at *s*. The delivery of the water of condensation from the rotating drum is accomplished through the arrangement shown in Figs. 1, 4, and 5. The hollow discharge-drum journal is divided into two parts by the horizontal partition-wall *t*, of which the upper part is connected with the uppermost only of the four hollow arms. On this one arm only is fastened a scraping-plate *u* inside the steam-jacket, which carries up the water of condensation at each revolution in the direction of the arrow and forces it out through the hollow arm, while the steam can escape through the other arms.

For introducing the material to be dried there is provided the hopper *k*, provided with a hinged lid.

Operation: The material to be dried may be fed in at *k*, passing in the direction of the arrow into the inner drum, through which it is forwarded by the spirally-attached chains *J*. From the other end of the drum the material

passes into the concentric space and is here carried back to the discharge *l*, which is located in the front wall *f* below the feed-inlet.

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

1. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow cylindrical drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with internal forwarding-chains and with a steam-jacket and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, and steam connections for the steam-space and steam-jacket, substantially as described.

2. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow cylindrical drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with a steam-jacket, and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, steam connections for the steam-space and steam-jacket, and trailing chains spirally attached within the said drum, substantially as described.

3. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow cylindrical drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with internal forwarding-chains and with a steam-jacket and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, steam connections for the steam-space and steam-jacket, and a number of shovels carried on the circumference of the drum, and operating within the trough and cover, substantially as described.

4. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with a steam-jacket and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, steam connections for the steam-space and steam-jacket, and a hood on said cover to serve as a collecting-space, substantially as described.

5. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with a steam-jacket and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, steam connections for the steam-space and steam-jacket, a hood on the cover to serve as a collecting-space, and trailing chains attached

within the said drum, substantially as described.

6. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with a steam-jacket and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, steam connections for the steam-space and steam-jacket, a hood on the cover to serve as a collecting-space, and a number of shovels carried on the circumference of the drum and operating within the trough and cover, substantially as described.

7. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with a steam-jacket and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, steam connections for the steam-space and steam-jacket, a hood on the cover to serve as a collecting-space, a number of shovels carried on the circumference of the drum and operating in the space between it and the trough and cover, and trailing chains attached within the said drum, substantially as described.

8. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with a steam-jacket and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, steam connections for the steam-space and steam-jacket, a cock communicating with the steam-space to remove water of condensation, and means within the steam-jacket of the drum to remove therefrom the water of condensation, substantially as described.

9. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with a steam-jacket and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, a hollow journal at one end of the drum, hollow arms carried on the journal and supporting the drum, said steam-jacket communicating with the hollow journal through the hollow arms, a steam-discharge pipe connecting with the journal, a partition in the journal in front of the opening of one of the hollow arms into the journal, and a scoop-plate in the steam-jacket behind the point of communication of said hollow arm with the steam-jacket, whereby water of condensation is removed from the steam-jacket, substantially as described.

10. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with a steam-jacket and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, steam connections for the steam-space and steam-jacket, a cock communicating with the steam-space to remove water of condensation, a scoop-plate within the steam-jacket of the drum to force water of condensation to the steam-discharge connection, and a cock on the steam-discharge connection, substantially as described.

11. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with a steam-jacket and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, steam connections for the steam-space and steam-jacket, means within the drum for stirring and forwarding the material to be dried toward the discharge end of the drum, and means between the drum and the trough for

stirring and forwarding in the opposite direction the material discharged into the trough from the drum, substantially as described.

12. In a drying apparatus, the combination of a stationary steam-jacketed trough, a hollow drum spaced above and rotating between two stuffing-boxes fastened to the trough, the drum being provided with a steam-jacket and discharging into the trough at the end thereof, means for rotating the drum, a cover for the trough, inclosing the said drum, steam connections for the steam-space and steam-jacket, trailing chains attached within the drum for stirring and forwarding the material to be dried toward the discharge end of the drum, and a number of shovels carried on the circumference of the drum, and operating in the space between it and the trough, for stirring and forwarding in the opposite direction the material discharged into the trough from the drum, substantially as described.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

MAX HECKING.

Witnesses:

WM. ESSENWEIN,
AUG. ESSENWEIN.