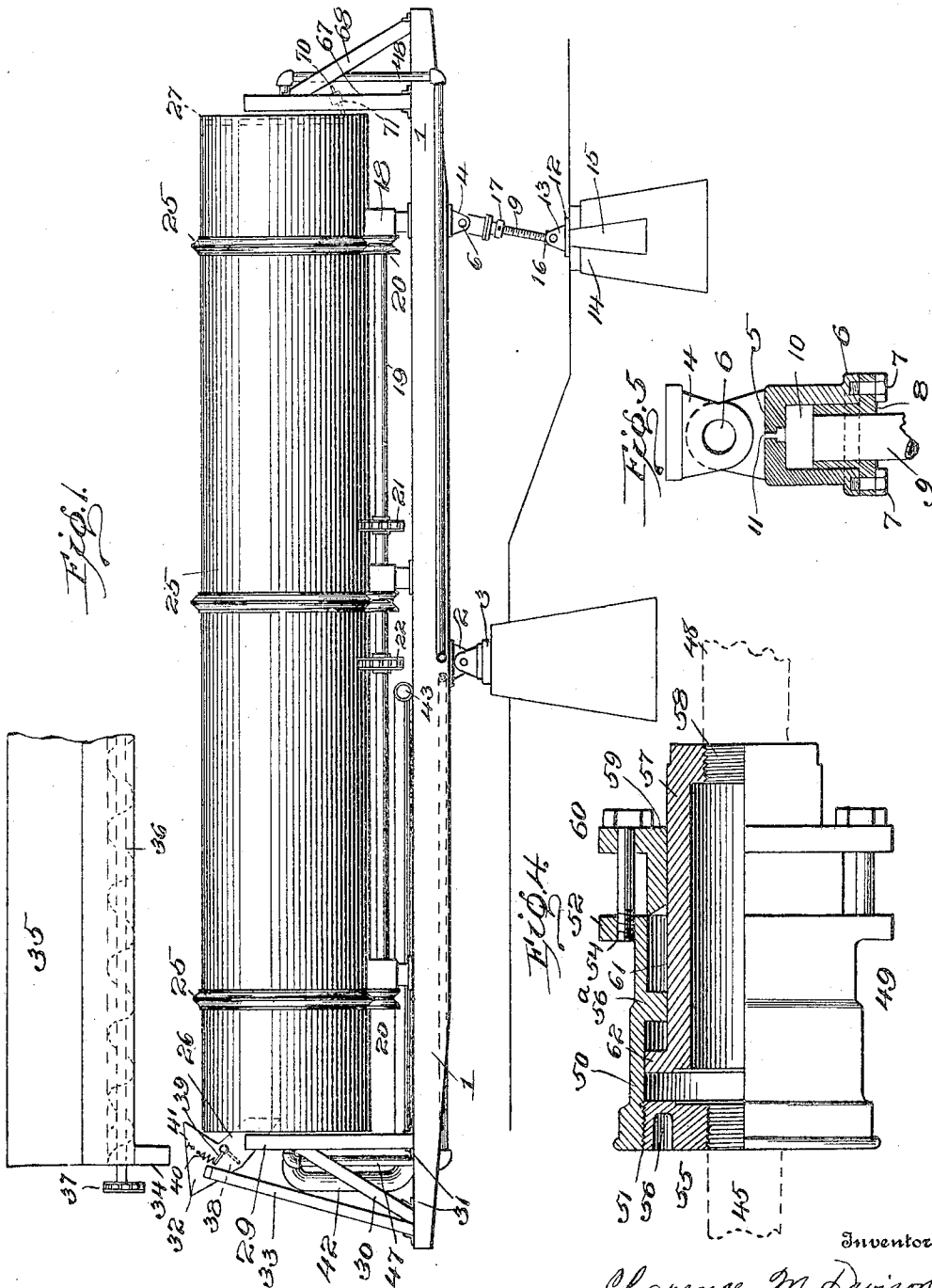


No. 813,358.

PATENTED FEB. 20, 1906.

C. M. DAVISON.
DRYING APPARATUS.
APPLICATION FILED MAR. 7, 1905.

2 SHEETS—SHEET 1.



Witnesses
J. M. Fowler Jr.
Edwin E. Vrooman.

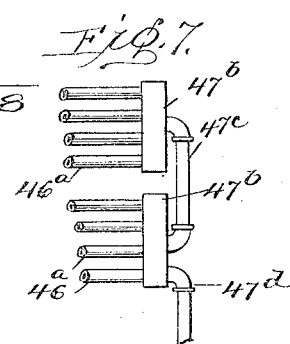
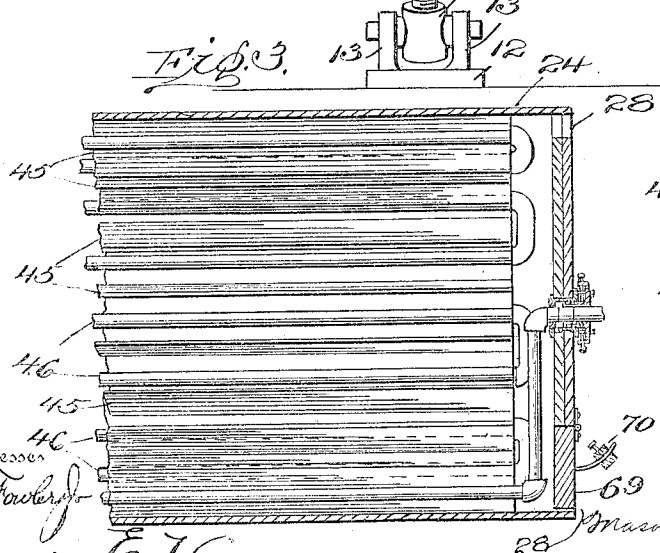
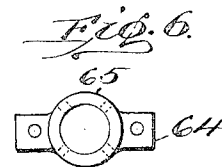
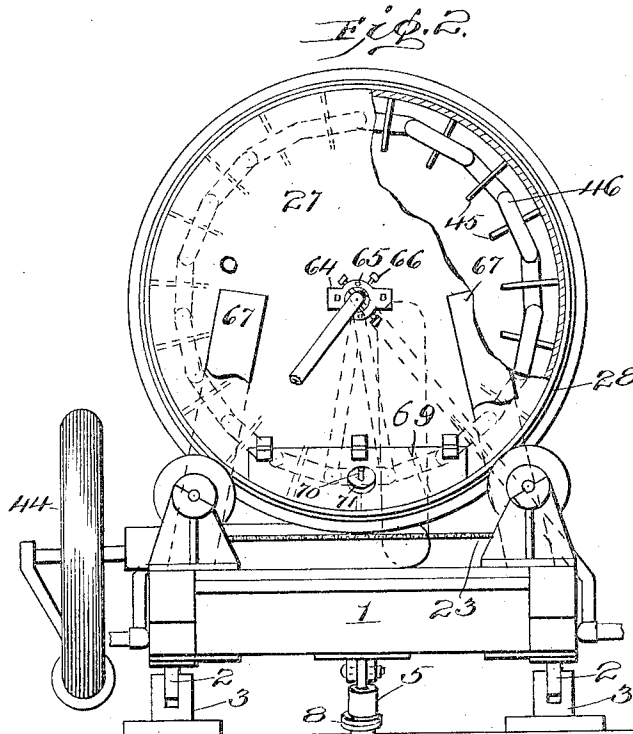
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

CLARENCE MARION DAVISON, OF NEWBURGH, NEW YORK.

DRYING APPARATUS.

No. 813,358.

Specification of Letters Patent.

Patented Feb. 20, 1906.

Application filed March 7, 1905. Serial No. 248,892.

To all whom it may concern:

Be it known that I, CLARENCE MARION DAVISON, a citizen of the United States, residing at Newburgh, in the county of Orange and State of New York, have invented certain new and useful Improvements in Drying Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in drying apparatus, and particularly to a sand-drier.

Among the numerous objects in view is the construction of an apparatus which is capable of being adjusted to different angles relative to a horizontal plane and retained in said adjusted position.

Another object of the invention is the construction of a tilting drier which is provided with a cylinder or drum having a steam-heated device positioned therein for drying the material as it travels through said cylinder.

A further object of the invention is the provision of means for tilting a frame, a rotatable cylinder or drum mounted upon said frame, and means positioned within said cylinder or drum for heating the same.

A still further object of the invention is the provision of means for tilting a frame to different angles relative to a horizontal plane and retaining said platform in its adjusted position, said platform provided with a rotatable cylinder or drum, removable means for closing the ends of said cylinder, and means positioned within said cylinder or drum for heating the same.

While I have mentioned a few of the objects in view, the invention consists of certain other novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described, illustrated in the accompanying drawings, and more particularly pointed out in the claims hereto appended.

In the drawings, Figure 1 is a view in side elevation of an apparatus constructed in accordance with the present invention. Fig. 2 is a view in elevation of the discharge end of the apparatus. Fig. 3 is a fragmentary longitudinal section of the discharge end of the cylinder or drum of the apparatus. Fig. 4 is a view in side elevation, partly in longitudinal section, of a coupling employed for connecting the steam-pipes within the rotatable cylinder to the stationary pipes carried by

the platform or frame of the apparatus. Fig. 5 is a fragmentary view, in side elevation, of the adjusting locking means for securing the apparatus in an adjusted position shown partly in section. Fig. 6 is a top plan view of a centering device employed in the construction of an apparatus of the character described. Fig. 7 is a fragmentary view of headers which are positioned between the ledges of the rotatable cylinder.

Referring to the drawings by numerals, 1 designates a tilting frame or platform. The frame or platform 1 is provided with central depending extensions 2, arranged in parallel position upon the bottom of the same and preferably nearer to the hopper-carrying end than the discharge end of the platform. The extensions 2 are journaled in supporting members 3, mounted upon suitable supporting means. Near the discharge end of the apparatus and secured to the bottom of the frame or platform 1 is an adjusting means for tilting the apparatus and retaining the same in its adjusted position. The adjusting means comprises a bifurcated member 4. The member 4 is secured centrally of the sides of the frame 1.

Secured to the depending member 4 is a hollow or inverted-cup-shaped member 5. The hollow member 5 is secured between the parallel extensions of member 4 by means of a transverse pin 6. The member 5 is provided with an annular extension 6, which is provided with threaded recesses formed for receiving bolts 7, employed for securing an annular member 8 in an assembled position with the hollow member 5, as is clearly seen in Fig. 5.

In constructing the adjusting means for the tilting platform 1 I employ a threaded bolt or member 9. The bolt or member 9 is provided with an integral head 10, which is positioned within the hollow member 5 when the members constituting the adjusting means are in their assembled position. After the head 10 of the bolt 9 is positioned within the hollow member 5 the member 8 is fastened, by means of bolts 7, to said member 5, thereby securing the bolt 9 within the hollow member 5. It will be obvious that the member 5 provides receiving means for securing one end of the bolt 9 in an operative position with the tilting platform 1. Said member 5 is provided with an aperture 11, which permits the head 10 to be lubricated.

The supporting member 12, provided with

two integral parallel extensions 13, is secured to a recessed support 14. The recess 15 of said support permits the bolt 9 to be fed downwardly through the internally-screw-threaded block 16.

The bolt 9 is provided with an integral annular extension 17. The extension 17 is provided with apertures. When it is desired to adjust the platform 1, rotation is imparted, through the medium of the extension 17, to bolt 9, causing the same to be fed through the block 16, and thereby tilt the platform or frame 1 upon the members 3. The members 3 are arranged off center of the platform or frame 1, and by reason of this arrangement the adjusting of the platform or frame 1 to and securing the same in a predetermined position is found to decrease the strain upon the supporting member 12 more than would be the case with the members 3 positioned exactly central of the ends of the platform.

Standards 18 are secured along the sides of the platform or frame 1. Within the standards 18 upon each side there is journaled a horizontal shaft 19. The shafts 19 are provided with grooved bearings 20. The bearings 20 are rigidly secured to the shafts 19. The shafts 19 are provided with sprocket-wheels 21 and 22. One set of sprocket-wheels is connected by means of a sprocket-chain 23. Sprocket-wheel 22 is connected to suitable driving means for imparting movement to one of the shafts, which through the medium of the sprocket-chain 23 drives the other shaft. The lower run of the sprocket-chain 23 is held straight as the entire strain of driving one of the shafts is brought to bear thereon, while the upper run of the chain sags, thereby permitting of the chain to pass under the rotatable cylinder or drum 24. In the drawings I have shown three grooved bearings 20, secured to each of the shafts 19. Secured to the outer surface of the cylinder or drum 24 is a corresponding number of beveled annular flanges 25. The annular flanges 25 are substantially V-shaped in cross-section, fitting snugly into the groove of the bearings 20. It will be obvious that while I have shown three grooved bearings upon each shaft and three annular flanges secured to the revoluble cylinder the number may be varied as found desirable. When rotary movement is imparted to the shafts through the medium of any suitable driving means, similar movement will be imparted to the cylinder or drum 24, which rests upon the grooved bearings of the shafts and is driven by frictional contact with the same.

Each end of the cylinder or drum is provided with means for closing the same, said means capable of being removed, and consequently leaving the end or ends of the cylinder opened when it is necessary to do so.

The hopper-carrying end of the frame 1 or sand-receiving end of the cylinder is provided

with a head 26, similar in construction to head 27, which closes the discharge end of the cylinder. The heads 26 and 27 are of less diameter than cylinder or casing 24, for the reason that they could not fit snugly against the inner surface of the cylinder, as this would affect the rotary movement of the same. A slight space, as will be seen in Fig. 2, at 28 is therefore formed between the heads 26 and 27 and the inner surface of the cylinder 24. The head 26 is supported upon standards 29 and 30, which are removably secured, by means of angle-irons, upon the platform or frame 1.

The hopper 32 is secured to the head 26, and a portion of the same projects into the cylinder 24. The upper portion of the hopper 32 is supported by a pair of standards 33. The standards or supports 30 and 33, like the standards 29, are removably secured to the frame or platform 1. The hopper 32 is positioned beneath the discharge end 34 of a feed-box 35. The feed-box 35 is provided with a screw conveyer 36, positioned in the bottom thereof. Driving means for actuating the screw conveyer 36 is connected by any suitable means to the sprocket-wheel 37. The size of the feed box or bin 35 may be such as to accommodate the entire load of a car. The sand is unloaded into the feed-box 35 and is fed by means of the conveyer 36 to the hopper and thence into the revoluble cylinder 24.

A swinging valve 38 is mounted within the hopper 32 and is provided with an arm 39 upon one side of the hopper 32. A spring 40 is connected at one end to the arm 39, and its opposite end is adjustably secured to the hopper at 41. The tension of the spring 41 is controlled by any ordinary means known to the art. The spring is tensioned so as to normally close the valve 38 when the sand is not being discharged into the hopper. The opening of the valve 38 is controlled by the sand, which is deposited into the hopper. If a large amount of sand is being discharged into the hopper, the valve will be opened to its fullest extent; but in the event of only a small supply being deposited in the cylinder 24 the size of the hopper will be decreased by reason of the action of the spring 40 upon the valve 38. One end of a pipe or tubing 42 is connected to a pump 44. (Shown in Fig. 2.) The pump 44 and the tubing 42 are employed for tending to create a vacuum within the cylinder 24 at the end supplied with the sand to be dried. The cylinder or drum 24 is provided with longitudinal ledges 45, secured to the inner surface of the same. The ledges project at right angles from the portion of the cylinder to which they are secured. A continuous tubing 46 is positioned between the ledges, said tubing being connected to an inlet-pipe 47 and an outlet-pipe 48, carried by the platform 1. Owing to the fact that the

cylinder 24 rotates, it will be obvious that the stationary pipes or tubings 47 and 48 and the steam-pipe within the cylinder must be movably connected for permitting of the movement of the cylinder.

The connection or coupling of the stationary pipes 47 and 48 to the endless coiled tubing or piping 45 is accomplished by a peculiarly-constructed device 49, which is clearly shown in Fig. 4. The coupling device 49 comprises an outer or primary sleeve 50, which is formed with an internally-screw-threaded surface 51 near one end thereof, and the opposite end of the sleeve 50 is provided with an annular integral extension 52. The integral extension 52 is provided with screw-threaded recesses 54. An internally and externally threaded member 55 engages the threaded end 51 of the sleeve 50 for securing the connecting end of the tubing 45 to the member. It is immaterial in describing this coupling device to specify specifically the exact end of the piping 45 which is secured in the ring or member 55. Recesses 56 are formed in the ring 55 for permitting of the insertion of a tool for tightening said ring within the sleeve 50 and upon the connecting end of the tubing 45. Intermediate the length of the sleeve 50 and formed upon its inner surface is an annular extension 56^a. Before the ring 55 is positioned within the sleeve 50 an auxiliary sleeve 57 is positioned within said sleeve 50, and subsequently the ring 55, constituting a locking member, is positioned within the sleeve 50 for not only coupling the tubing 55 to the device, but also to secure said auxiliary sleeve 57 in an assembled position within the sleeve 50. An internally-screw-threaded surface 58 is formed upon the sleeve 57 near the outer end thereof. An exhaust-pipe 48 engages the screw-threaded surface 58 of the auxiliary sleeve 57. In like manner the inlet-pipe 47 will be similarly positioned within the auxiliary sleeve 57 of the device, coupling the opposite end of the tubing 45 to the inlet-pipe 47. A gland 59 is secured, by means of bolts 60, upon the auxiliary sleeve. Any suitable packing may be positioned within stuffing-box 61. The sleeve 57 is permitted to slide longitudinally within the primary sleeve 50 to a slight degree, owing to the fact that the inner annular extension 62 of the sleeve 57 is only limited against movement by members 55 and 56^a. Upon each of the heads or end members 26 and 27 there is secured a plate 64, said plate being secured to said head by any suitable means. An annular extension 65 is integrally secured to each of the plates 64. Adjustable bolts 66 are threaded in the annular extension 65 of the plate 64, said plates 66 engaging the coupling device 49 for permitting said device to be secured exactly in the center of the cylinder-head.

The head 27 is supported upon vertical

standards 67, said standards engaged by bracing-standards 68. Standards 67 and 68 are removably secured to the platform or frame 1.

Hinged to the head 27, near the lower portion thereof, is a door constituting a valve member, said door being provided with a threaded extension 70, upon which is adjustably positioned a weight 71. The weight can be adjusted upon the extension 70 to different positions for exerting a greater or less pressure upon the hinged member constituting the valve means for holding it closed. Of course it will be obvious that if the weight 71 is positioned against or near the outer surface of the door the action of the weight for holding the door or valve member closed will not be as great as if the weight was adjusted to the extreme end of the extension 70. The action of the weight upon the door or valve member 69 is similar to the action of the spring 40 upon the valve member 38.

The sand fed to the revolving cylinder 24 is deposited upon or against the ledges 45, as well as the heated tubing, the sand being tossed or thrown from side to side and carried from the bottom to the top of the cylinder as it travels from the intake to the discharge end thereof. Of course it is preferable to tilt the platform, and consequently the cylinder 24, before the sand is fed to said cylinder, as the tilting of the cylinder 24 and securing the same in the adjusted position will feed the sand through the cylinder somewhat similar in operation to a screw conveyor. After the platform carrying the revolvable cylinder has been adjusted to its desired position it will be retained in said position by the adjusting means assembled therewith near the discharge end of the cylinder.

In Fig. 7 I have shown an embodiment of my invention in which I employ instead of a single steam-pipe between the ledges headers which comprise a plurality of parallel pipes 46^a and a connecting member 47^b. The members 47^b are connected by a tubing 47^c. When employing headers instead of a single tubing between the longitudinal ledges 45, the inlet-pipe is secured to one of the members 47^b at one of the ends of the cylinder, while the exhaust or outlet pipe is secured to a header at the opposite end of the cylinder. One of the members 47^b of the header is provided with a tubing 47^d, to which either the outlet or inlet pipe, as the case may be, is secured.

What I claim is—

1. In an apparatus of the class described, the combination of a pivotally-mounted frame, adjusting means for said frame, said adjusting means comprising a movable hollow member secured to said frame, a revolvable, threaded bolt positioned within said hollow member, a threaded, apertured member,

said revoluble bolt positioned within said apertured member, and sand-drying means carried by said frame.

2. In a drying apparatus, the combination
5 with a support, a revoluble cylinder journaled upon said support, of removable heads carried by said support and closing the ends of said cylinder, a valved hopper secured to one of said heads, a weighted door secured to the
10 other head, a steam-pipe positioned within said cylinder, and means for driving said cylinder.

3. In a drying apparatus, the combination
15 of an adjustable frame, a revoluble cylinder journaled upon said frame, longitudinal ledges secured within said cylinder, a single tubing coiled around said cylinder and partly surrounding said ledges, removable means
20 closing the ends of said cylinder, a vacuum-pump connected to one end of said cylinder, inlet and outlet tubings connected to said coiled tubing positioned within the cylinder, a valved hopper carried by the means closing
25 one of the ends of said cylinder, and means for driving said cylinder.

4. In a drying apparatus, the combination
of an adjustable frame, a cylinder carried by said frame, removable heads carried by said
30 frame and closing the ends of said cylinder, a steam-pipe secured within said cylinder, inlet and outlet tubings secured upon said frame, coupling devices connecting said tubings and steam-pipe, valved inlet and outlet
35 means formed upon said heads, and means for imparting movement to said cylinder.

5. In a drying apparatus, the combination
with a support, of a frame movably mounted off center upon said support, adjusting means
40 for said frame, said adjusting means comprising a revoluble member, supporting means for said member, means connecting said member to said frame, parallel shafts
45 journaled upon said frame, grooved bearings secured to said shaft, a cylinder, annular members substantially V-shaped in cross-section secured to the outer surface of said cylinder, said annular members resting within the
50 grooved portions of said bearings, means for driving said shafts and imparting rotary movement to said cylinder, removable heads
55 secured within the ends of said cylinder, one of said heads provided with a valved hopper, the other head provided with a weighted door, longitudinal ledges secured within said cylinder, a continuous tubing positioned between
said ledges, stationary inlet and outlet tubings secured to said frame, and an adjustable
60 coupling connecting said stationary tubings and the tubing secured within said cylinder.

6. In an apparatus of the character described, the combination with a support, of a
65 pivotally-mounted frame carried by said support, adjusting means for said frame, said adjusting means comprising a pivotally-mounted cup-shaped member, a bolt provided with

a head, the headed portion of said bolt being positioned within said cup-shaped member, an annular member positioned upon said bolt and secured to said cup-shaped member, a
70 supporting member provided with parallel extensions carried by said support, a threaded block movably mounted upon the parallel extensions of said supporting member, said bolt threaded into said block, and drying
75 means carried by said frame.

7. In an apparatus of the class described, the combination with a support, of a movable frame carried by said support, an adjusting device for said frame, said adjusting
80 device comprising a hollow member pivoted at one end to said frame, a revoluble member having one end positioned within said hollow member, an annular member positioned upon said revoluble member and fixedly secured to
85 said hollow member, a pivotally-mounted member carried by said support, said revoluble member threaded into said pivotally-mounted member, and drying means carried by said movable frame.

8. In an apparatus of the character described, the combination with a support, of a
90 frame pivotally mounted upon said support, an adjusting device for said frame, said device comprising a movable, substantially cup-shaped member pivotally secured to the
95 bottom of said frame, a revoluble member, means connecting said revoluble member to said support, and drying means carried by said frame.

9. In an apparatus of the character described, the combination with a support, of a
100 revoluble cylinder carried by said support, stationary pipes carried by said support, a pipe positioned within said cylinder, coupling devices connecting the ends of said pipe within said cylinder with the stationary
105 pipes, each of said coupling devices comprising a primary member provided with a threaded end and an integral, internal, depending portion, a slidable, auxiliary member positioned within said primary member, said auxiliary member provided with an
110 annular extension formed upon one end thereof, the annular extension positioned between the internal, depending portion and the threaded portion of the primary member, a
115 ring positioned within and engaging the threaded portion of said primary member, and a gland positioned upon said auxiliary member and secured to said primary member.

10. In an apparatus of the character described, the combination with a support, of a
125 movably-mounted frame carried by said support, an adjusting device for said frame, said adjusting device comprising a rotatable member pivotally mounted upon said frame, a movable member carried by said support, the lower portion of said revoluble member
130 threaded into said movable member carried

by the support, and drying means carried by said frame.

11. In an apparatus of the character described, the combination with a support, of a
5 movable frame carried by said support, an adjusting device for said frame, said adjusting device comprising a hollow member provided with an open bottom and a closed top, pivotally secured to the bottom of said frame,
10 a movable member carried by said support, and vertically-adjustable means supported by said movable member and having its upper portion positioned within said member, and drying means carried by said frame.

12. In an apparatus of the character described, the combination with a support, of a
15 movable frame carried by said support, an adjusting device for said frame, said adjusting device comprising an inverted, substantially cup-shaped member pivoted to said
20 frame, revoluble means carried by said support and positioned within said substantially cup-shaped member, parallel shafts carried by said frame, bearings fixedly secured to
25 said shafts, a cylinder carried entirely and driven by said bearings, and drying means carried by said frame and positioned within said cylinder.

13. In an apparatus of the character described, the combination with a support, of a
30 movable frame carried by said support, parallel, horizontal shafts positioned upon said frame, bearings fixedly secured to each of said shafts, a cylinder carried entirely and driven by said bearings, drying means positioned within said cylinder, an adjusting
35 device for said frame comprising an inverted, receiving member, and revoluble means seated within said receiving member and connected to said support.

14. In an apparatus of the character described, the combination with a pivotally-mounted frame, of an adjusting device for
40 said frame, said adjusting device comprising a member, constituting a container, pivotally secured to said frame, and adjusting
45 means for lifting said frame and retaining it in an adjusted position, having one end seated within said container, and drying means carried by said frame.

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

CLARENCE MARION DAVISON.

Witnesses:

EDWARD T. FENWICK,
JOHN L. FLETCHER.