

March 2, 1948.

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2,437,004

STEAM HEAD FOR DRIER DRUMS

Filed Sept. 9, 1946

2 Sheets-Sheet 1

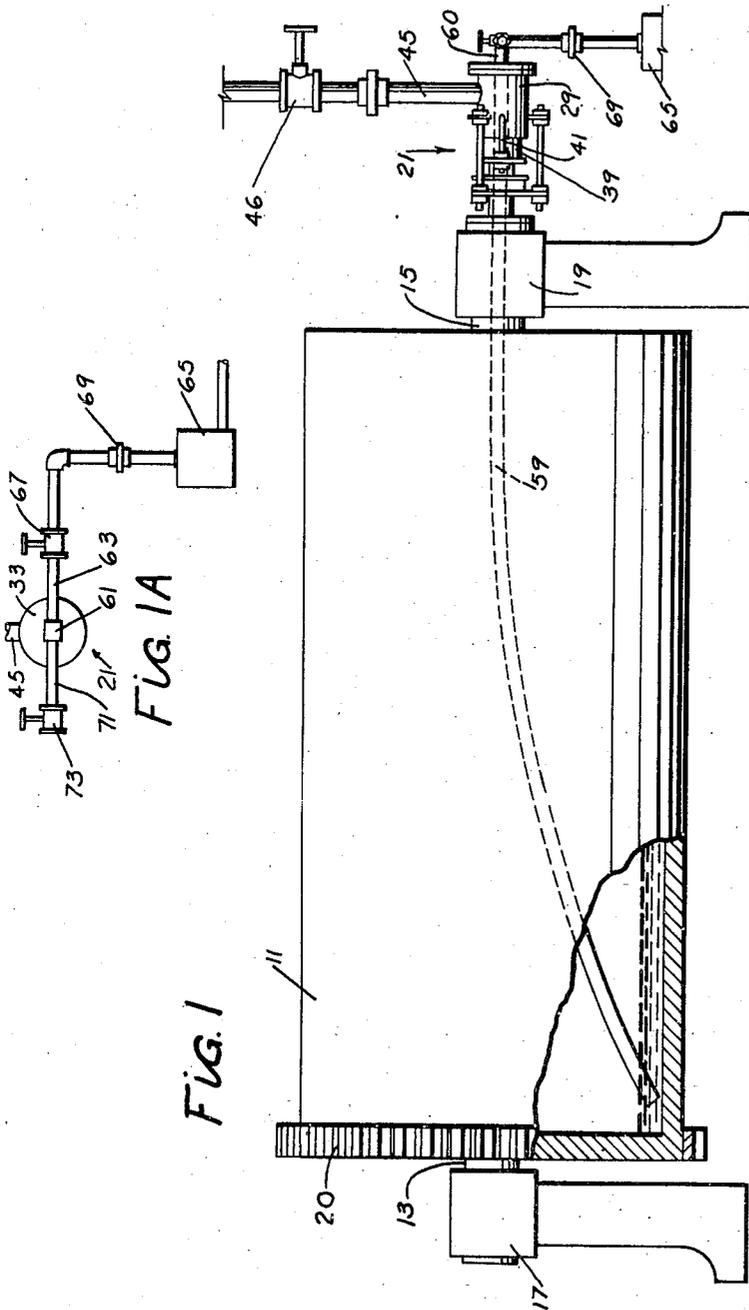


FIG. 1

FIG. 1A

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March 2, 1948.

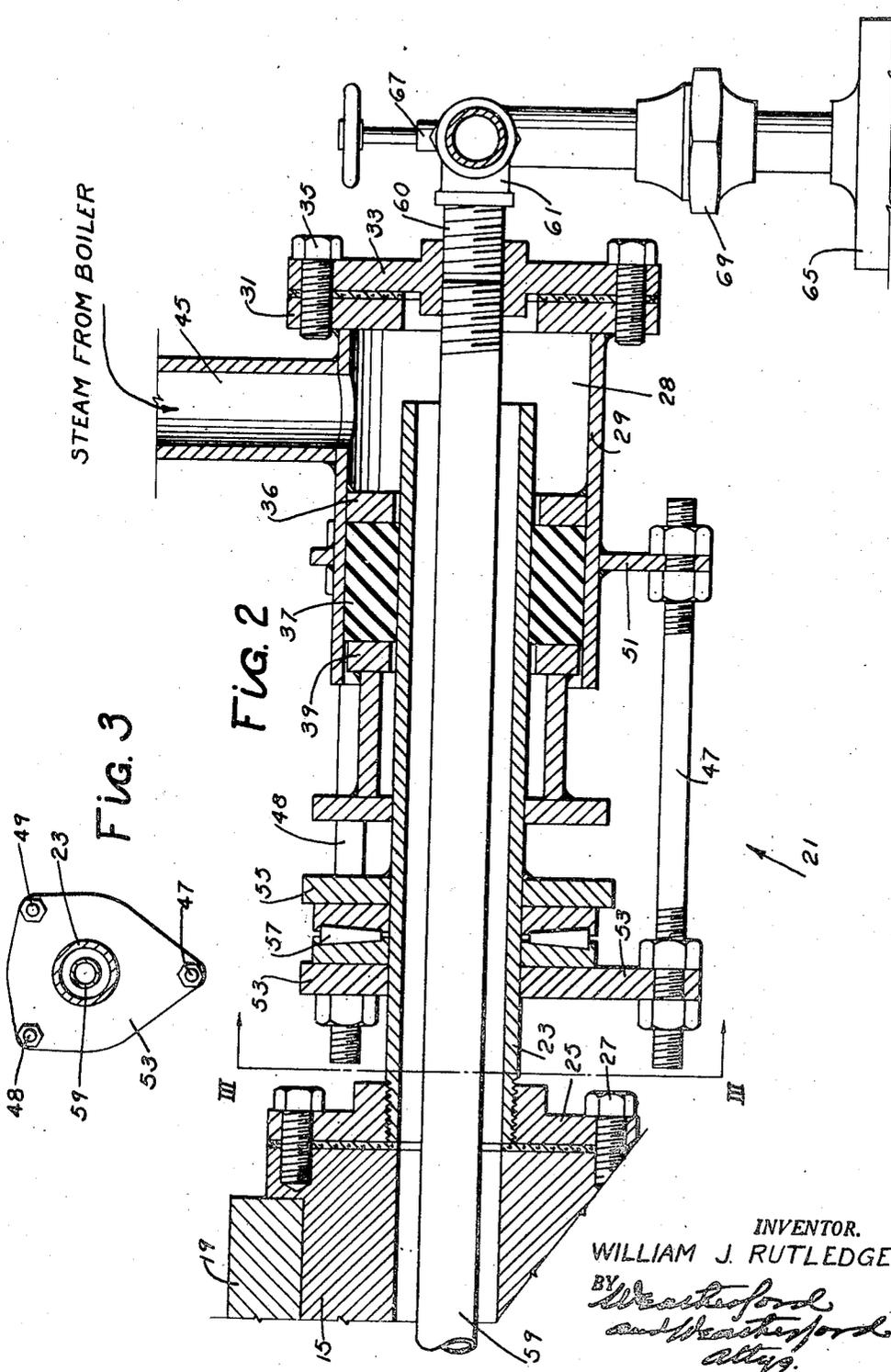
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# UNITED STATES PATENT OFFICE

2,437,004

## STEAM HEAD FOR DRIER DRUMS

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Application September 9, 1946, Serial No. 695,780

3 Claims. (Cl. 34-124)

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This invention relates to heads which are mounted on hollow rotatable drums such as are used for drying paper stock, for the purpose of introducing steam into the drums to heat the drums, and for removing the water of condensation therefrom and has especial relation to a head of this kind in which the pipe through which the water of condensation may be readily adjusted into a position which will insure the removal of the maximum amount of water of condensation.

In making paper, the stock is formed into a continuous sheet, which is passed over drying drums. These drums are hollow cast iron drums, a very common size being some three feet in diameter and five feet long with thick walls, and are journaled in suitable bearings at their opposite ends and are turned at quite a slow rotational speed.

One of the journals is hollow and steam is introduced from a steam head through this hollow journal into the drum. The steam introduced condenses rapidly, and the water of condensation is removed through a pipe which leads back through the same journal and steam head to a suitable steam trap. Difficulty, however, is had in present installations in removing the water of condensation, either too great a depth remaining, if the end of the pipe be too high or grinding to a closure if it be too low and contacts the drum. The present invention is primarily directed to the means by which this water is removed, and the way in which adjustment may be made in order to insure that a minimum amount of water may be retained, without danger of cut off.

The object of the invention is primarily to provide a simple and efficient steam head, which includes means for discharging the water of condensation and means for adjusting this discharge means to regulate the depth of water retained in the drier drum.

The means by which this and other objects are accomplished will readily be understood from the following specification on reference to the accompanying drawings in which

Fig. 1 is a side elevation of a typical drying drum with steam head attached, one corner of the drum being broken away in section.

Fig. 1A is an end elevation showing discharge piping.

Fig. 2 is a sectional elevation on a much enlarged scale of the steam head; and

Fig. 3 is a transverse sectional elevation on about one half the scale of Fig. 2, taken on the line III-III of Fig. 2.

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Referring now to the drawings in which the various parts are indicated by numerals: 11 is a hollow drum which is carried by trunnions 13 and 15 extending from its opposite ends and journaled in bearings 17 and 19. Drum 11 may be driven as through a ring gear 20, in usual or desired manner of such drying drums, by means, which being in no way germane to the present invention, have purposely not been shown.

One of the trunnions, as the trunnion 15 is hollow and beyond the bearing 19 has secured thereon a steam head generally designated by the number 21. This head includes a tubular member 23, exteriorly smoothly turned, which preferably has the same bore as the trunnion 15; and is connected through a rigidly attached flange 25 and screws 27 thereto, and turns therewith. The tubular member 23 extends through and rotates in a stuffing box forming a part of the steam head 21 and into the steam chamber 28 of the head which does not rotate. The head comprises a cylindrical barrel 29, having at its outer end a flange 31 and a closure plate 33 secured to the flange by screws 35; and at its inner end the stuffing box, which box includes an annular flange 36 integrally secured within the barrel to form the bottom of the box, and loosely surrounding the tubular member 23, packing 37 embracing the member 23, and a gland 39, which lies loosely within the stuffing box and against the packing 37, and is held in place by gland bolts 41 (Fig. 1 only). Steam is supplied to the steam chamber 28 through a pipe 45, from a boiler or other source not shown. 46 is a cut off valve.

Steam chamber 28 is retained against longitudinal displacement from the tubular member 23 by bolts 47, 48 and 49 which extend from a flange 51 rigidly secured to the barrel 29, to and through an annular flange 53 which is disposed around the tubular member 23 and is held against longitudinal displacement by bearings 57 which may be of roller type, and which abut against a flange 53 rigidly secured to the tubular member. It will here again be noted that the stuffing box gland 39 is rather loosely disposed in the stuffing box, and that the flange 36 forming the bottom of the stuffing box, does not closely embrace the tube 23 so that angularity of the barrel 29 and its closure plate 33 with respect to the tubular member 23 may be effected by distortion of the packing 37.

The bolts 47, 48 and 49 are so arranged that adjustment of the alinement of the barrel 29 and stuffing box, relatively to the tubular member 23 may easily be made.

The closure plate 33 of the steam head bar-

rel 29 is centrally apertured and has secured therewith a discharge pipe 59 which extends horizontally through the steam chamber 28, the tubular member 23 and the hollow trunnion 15 into the drying drum 11, the pipe being of much less size than the bore of the tubular member 23 and the trunnion so that an annular space for passage of steam and for adjustment is left around the pipe. The pipe 59 extends within the drum preferably into adjacency to the opposite end of the drum and is arcuately curved and so secured to the head 33 that it extends arcuately downward. The amount of downward deflection is substantially one half the interior diameter of the drum so that the pipe when horizontally disposed through the center of the tubular member 23 will curve downward substantially into contact with the inside of the drum. The relation of the drum length to the drum diameter is usually such that this curvature may be effected and yet it still be possible to insert the curved pipe through the bore of the trunnion when the head 21, including the tubular member 23, is disconnected.

From the closure plate 33 an extension 60 of the discharge pipe 59 continues oppositely preferably through a T 61 and pipe 63, which leads horizontally away from said T and downward to a steam trap 65, the flexibility of the horizontal and vertical portions of the pipe readily permitting the minor movements of the extension 60 during adjustment of the discharge pipe 53. Interposed successively in the pipe 63, as it leads from the T to the trap, are a trap cut-off valve 67 and union 69. Extending oppositely from the T 61 is a blow-off pipe 71 and blow-off valve 73.

In assembling the head as a unit, detached from the steam source and the steam trap, is approached to the hollow trunnion 15, the downwardly curved discharge pipe 59 is inserted through the bore of the trunnion and the flange 25 bolted tightly to the trunnion. The steam pipe 45 is connected to the steam source and the discharge pipe extension 60 connected to the steam trap 65. The blow-off valve 73 is opened, the trap valve 67 is closed and steam blown through the drum until discharge of water substantially ceases indicating that the drum is heated. The trap valve 67 is opened, and the blow-off valve 73 closed.

The drum 11 is started and if the end of the discharge pipe 59 is not heard to grate on the rotating drum, the bolts 47, 48 and 49 are relatively adjusted until such condition is set up. When the vertical position of the pipe is thus determined, the bolts 48 and 49 may be relatively adjusted to determine whether the condition is due solely to vertical positioning of the pipe end or in part to its being horizontally off center, and if the latter to effect correction. After horizontal adjustment grating contact may be reestablished, and such further adjustment of the three bolts be made as is necessary to stop the grating of the pipe on the drum. It will be obvious that at any time during operation, adjustment of the bolts may be made if the discharge pipe for any reason should start grating or if desired, test may be made by establishing grating contact to insure that the end has not been set so high that unsatisfactory removal of condensation water is being made.

If it be desired at any time to drain the drum 11, the steam pipe valve 46 and the steam trap valve 67 may be closed, and the blow-off valve 73 opened, allowing the steam pressure remain-

ing in the drum 11 to blow out the water of condensation.

I claim:

1. In a drier as for paper stock, a hollow drum having a cylindrical barrel and heads, and means, including a hollow trunnion journalling said drum; a tubular cylindrical member open at its outer end, secured to and extending axially from and turning with said trunnion, a steam head including a nonrotatable hollow casing embracing the open end of said tubular member, a stuffing box forming part of said casing embracing said member adjacent its open end and effecting a seal between said member and said casing, a plate rigidly secured to and closing the outer end of said casing, and a steam line leading into said casing; a condensation discharge pipe rigidly secured to said plate and opening therethrough, said pipe extending from said plate axially through said tubular member and said trunnion and within said drum curving downwardly to bring its intake end into adjacency to said drum barrel, said pipe being relatively much smaller than the bore of said tubular member and trunnion to leave an annular space therearound for the passage of steam through said member and for adjustment of alinement of said pipe relatively to said member and trunnion; and means for restraining displacement of said casing from and adjusting angularity of said discharge pipe with respect to said tubular member and adjacency of the intake end of said pipe to said drum, including bolts and anchor means therefor respectively secured to said head and said tubular member, one of said anchor means being rigidly secured to said steam head, and the other thereof including an abutment rigidly attached to said tubular member, a relatively rotary flange and an interposed thrust bearing, said bolts having nuts thereon and extending from said rigidly secured anchor means to said flange, said nuts being adjustable to vary the angularity of said head and said discharge pipe carried thereby with respect to said tubular member, and the adjacency of the intake end of said discharge pipe to the barrel of said drum.

2. In a drier as for paper stock, a hollow drum having a cylindrical barrel and heads, and means including a hollow trunnion journalling said drum; a tubular cylindrical member open at its outer end, secured to, extending axially from and turning with said trunnion, a steam head including a nonrotatable hollow casing embracing the open end of said tubular member, a stuffing box forming part of said casing embracing said member adjacent its open end and effecting a seal between said member and said casing, a plate rigidly secured to and closing the outer end of said casing, a steam line leading into said casing; a condensation discharge pipe rigidly secured to said plate and opening therethrough, said pipe extending from said plate axially through said tubular member and said trunnion and within said drum being arcuately curved downwardly to bring its intake end into adjacency to said drum barrel, said pipe being relatively much smaller than the bore of said tubular member and trunnion; to leave an annular space therearound for the passage of steam through said member and for adjustment of the alinement of said pipe relatively to said member and trunnion, and means for restraining displacement of said casing from and adjusting angularity of said discharge pipe with respect to said tubular member and adjacency of the intake end of said pipe to said drum,

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including an annular flange in which said member turns, abutment means secured on said member between said casing and said flange, and a thrust bearing interposed between said flange and said abutment bolts secured to said casing extending through and secured to said flanges by nuts, said nuts being adjustable to vary the angularity of said steam head with respect to said member and the adjacency of the intake end of said head carried discharge pipe to the barrel of said drum.

3. In a drier as for paper stock, a hollow drum, having a cylindrical barrel and heads, and means including a hollow trunnion journalling said drum; a tubular cylindrical member open at its outer end secured to and extending axially from and turning with said trunnion, a steam head including a nonrotatable hollow casing embracing the open end of said tubular member, a stuffing box forming part of said casing loosely embracing said member packing disposed in said box and a loosely fitting gland confining said packing to effect a seal between said member and said casing, a steam line leading into said head; a condensation pipe extending through said head and rigidly secured thereto, one end of said pipe extending from said head axially

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through said tubular member and said trunnion and being arcuately curved downwardly into adjacency to said drum barrel, said pipe being relatively much smaller than the bore of said tubular member and trunnion to leave an annular space therearound for the passage of steam through said member and for adjustment of alinement of said pipe relatively to said member and trunnion; and means for restraining displacement of said head from said tubular member and adjusting the angularity of said head carried discharge pipe with respect to said tubular member and the adjacency of the intake end of said pipe to said drum.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,575,615	Broughton -----	Mar. 9, 1926
1,665,614	Valentine -----	Apr. 10, 1928
1,920,567	Keck -----	Aug. 1, 1933
2,056,562	Bridge -----	Oct. 6, 1936
2,299,530	Cram -----	Oct. 20, 1942