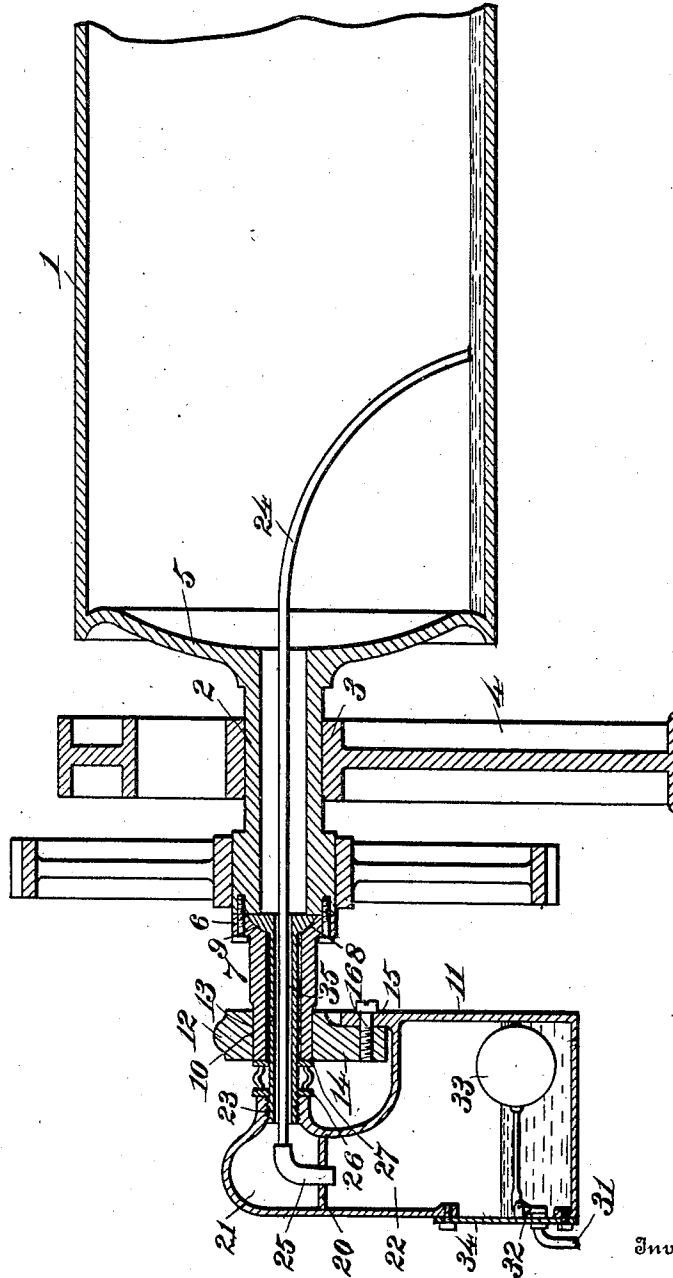


F. L. ALLEN.
STEAM SEPARATOR.
APPLICATION FILED NOV. 16, 1908.

935,772.

Patented Oct. 5, 1909
2 SHEETS—SHEET 1

Fig. 1



Inventor

Frank L. Allen

Witnesses

H. S. Austin
M. R. Alfred

334

Joshua R. H. Potts
Attorney

F. L. ALLEN.
STEAM SEPARATOR.
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2 SHEETS—SHEET 2.

Fig. 2.

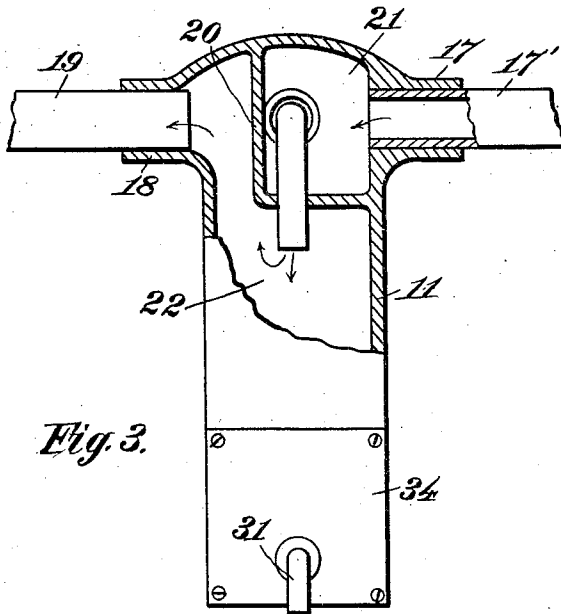
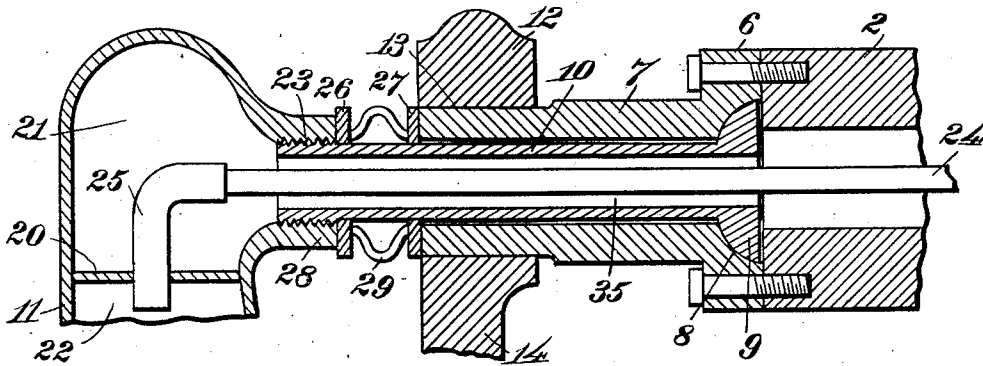


Fig. 3.

Witnesses

H. S. Austin,
M. R. Ayles

Inventor

Frank Allen

By

Joshua R. H. H. H.

Attorney

UNITED STATES PATENT OFFICE.

FRANK L. ALLEN, OF ST. JOSEPH, MICHIGAN.

STEAM-SEPARATOR.

935,772.

Specification of Letters Patent.

Patented Oct. 5, 1909.

Application filed November 16, 1908. Serial No. 462,942.

To all whom it may concern:

Be it known that I, FRANK L. ALLEN, a citizen of the United States, residing at St. Joseph, county of Berrien, and State of Michigan, have invented certain new and useful Improvements in Steam-Separators, of which the following is a specification.

My invention relates to steam separators, that is to devices for removing the water of condensation from the steam before conducting the latter to places for further use.

Although my invention may be used in conjunction with almost any steam operating or consuming device, it is particularly adapted for use with paper web drying machines, and I have so illustrated it in the accompanying drawings and described it in the following specification.

The object of my invention is to provide means for removing the water of condensation from a rotating member through which steam is passing in order to maintain said member substantially free of water and to separate the water and the steam so that the latter may be again used without being contaminated or mixed with the water of condensation.

Other objects will appear hereinafter.

My invention will be more readily understood by reference to the accompanying drawings forming a part thereof and in which—

Figure 1 is a vertical longitudinal section through one end of a cylinder of a paper drying machine, equipped with a steam separator embodying my invention in its preferred form. Fig. 2 is an enlarged detail section of the journal and the adjacent parts. Fig. 3 is a front elevation of one of the separators partially in section.

Referring to the drawings, 1 indicates the cylinder of a paper drying machine or other rotary member through which steam is adapted to pass, and 2 a hollow journal for the same which is supported in bearings 3, formed in a frame 4. The cylinder 1 is provided with a head 5 upon which the journal 2 is formed.

Fixed to the end of the journal portion 2 is a tubular extension 7 which is arranged in axial alinement with the portion 2 and forms part of the journal. The inner end of the extension 7 is provided with a peripheral flange 6 through which the bolts extend for attaching the extension to the portion 2.

The bore of the extension is somewhat smaller than the bore of the journal 2.

The inner end of the extension 7 is formed with an annular seat 8, whose face is concaved and ground to fit tightly against a packing ring 9, said ring having an interior diameter considerably less than that of the bore of the journal 2. Extending from the packing ring and preferably formed integrally therewith is a tubular sleeve 10 which fits within the extension 7 forming a lining for the same. The sleeve 10 extends beyond the outer end of the extension 7 and is threaded for connection with the casing of the steam separator proper. The packing ring in cross-section is the segment of a circle, one of the flat faces of which bears against the inner end of the journal 2, while its curved or convex face bears against the seat 8.

The water collector and steam separator comprises a rectangular casing 11 which is attached to and supported by a hanger 12 loosely mounted on the journal extension 7. The extension is reduced in diameter as at 13 to receive the hanger 12, and the hanger is widened out at its bottom to form a plate 14 to which an upwardly extending flange 15 on the inner edge of the separator is attached by bolt 16. At the upper end of the separator is an inlet opening 17 formed with a nipple for the attachment of a conducting pipe conveying steam from a boiler or other source of supply, while directly opposite is an outlet opening 18 having a nipple to which a conducting pipe 19 is attached leading to another source of steam consumption.

The upper end of the casing 11 is provided with a partition which divides the separator into two chambers 21 and 22. This partition extends downwardly from the top of the casing at one side of the opening 23 leading from the sleeve 10 to a point below the level of the inlet pipe 17, and then extends to the side of the separator below the entrance of the pipe. The sleeve 10 is threaded into the aperture 23, hence the inlet chamber 21 is in direct communication with the cylinder 1 through said sleeve and the bore of the journal 2.

Located within the tubular journal 2 and its extension 7 and suitably spaced therefrom is a steam and water conducting pipe 24, the inner end of which is downwardly turned and extends to a point adjacent to the low-

est point of the cylinder. At its outer end the pipe 24 projects through the extension 7 and terminates in an elbow 25 which extends through the partition 20 into the chamber 22. The pipe 24 is for the purpose of conducting steam and condensed water from the cylinder to the separator, while the annular space surrounding the same is for the purpose of conducting the steam from the inner chamber 21 to the interior of the cylinder.

In order that a steam tight joint shall be made between the rotating journal-extension 7 and the said lining 10, so that steam may not escape around the lining or at the junction of the journal with the separator, I provide the expansible thrust collars 26—27, working in connection with the packing ring 9 and lining sleeve 10. The rear face of the upper end of the separator is formed with a shoulder 28 and located between this shoulder and the end of the extension 7 are the expansible thrust collars above referred to. The collars are separated by springs 29 which force the same apart.

The operation of the thrust collars is evident from the drawing. The sleeve 10 carries at its inner end the packing ring 9, and at its outer end has a threaded connection with the separator casing as before described. The outward pressure of the thrust collars against the shoulder of the separator casing draws the sleeve outward, and forces the convex face of the packing ring into close engagement with the concave face of the seat 8. Consequently, as the cylinder rotates these two surfaces will move upon each other and soon wear to a tight joint, thereby preventing steam from passing out around the outer face of the packing ring. At its forward end of the sleeve 10 is connected to the separator by a steam tight joint. It will be seen from the foregoing description, that I have provided a rotary packing which is kept constantly steam tight and which operates automatically to provide a ground joint for itself.

At the lower end of the compartment 22 of the separator, I provide a water drain pipe 31, the opening to the drain being controlled by a valve 32 operated by a float 33 pivoted on brackets projecting from the side of the casing. The float is so adjusted that it will close the valve before the water sinks to the level of the pipe 31. The lower end of the casing may be provided with a removable plate 34 whereby the casing may be cleaned out when desired, or the ball valve adjusted.

The operation of the device is as follows: Steam is admitted through the pipe 17' into the compartment 21 of the separator, from which it passes by the annular inlet 35 to the interior of the cylinder 1. The water of condensation will accumulate at the lowest point of the cylinder around the mouth of the pipe 24. If the water is deep enough to cover the mouth of the pipe the steam entering the cylinder will positively force the water out through the pipe and into the compartment 22 of the separator. The water will fall to the bottom of the separator and the steam will pass out the opening 18 and pipe 19 to a further source of steam consumption.

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

1. In a device of the class described, a rotary cylinder having a tubular journal, a separator casing suspended loosely from said journal, a drain pipe in the lower portion of said casing, a steam conducting pipe leading from the upper portion of the casing a compartment formed in the upper portion of the casing having connection through said tubular journal with the interior of the cylinder, means for admitting steam to said compartment, and a steam and water outlet pipe leading from the lower portion of the interior of said cylinder through said journal and said compartment into the lower portion of said casing, substantially as described.

2. In a device of the class described, a cylinder having a tubular journal, a casing suspended loosely from said journal, a partition in said casing dividing the same into two compartments, a drain pipe in the lowest portion of one of said compartments, a steam conducting pipe leading from the upper portion of the same, the second compartment being in communication with said cylinder, means for admitting steam to said second compartment, and a steam and water outlet pipe leading from the lowest portion of the interior of said cylinder out through said journal said second compartment and said partition into the first said compartment, substantially as described.

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

FRANK L. ALLEN.

Witnesses:

A. CANAVAN,
MATTHIAS WEBER.