

No. 891,468.

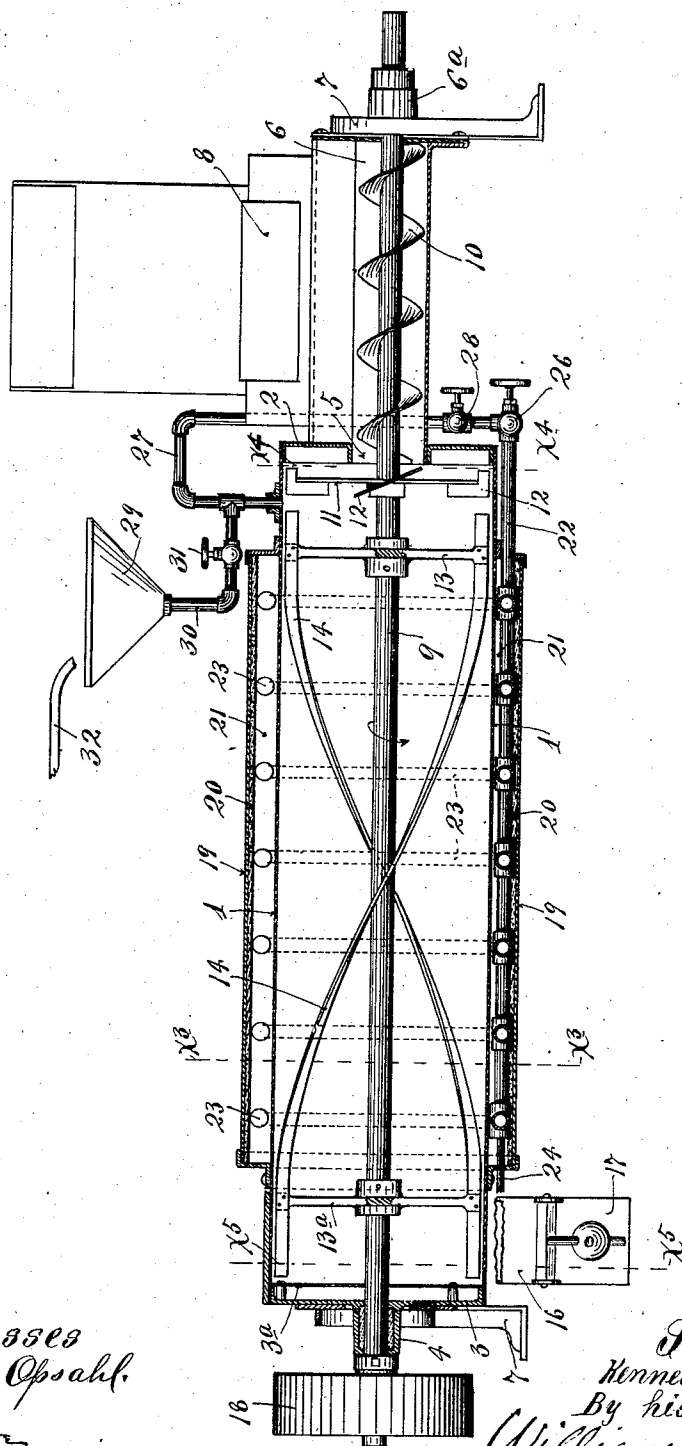
PATENTED JUNE 23, 1908.

K. DOUGAN.
WHEAT STEAMER.

APPLICATION FILED NOV. 14, 1906.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

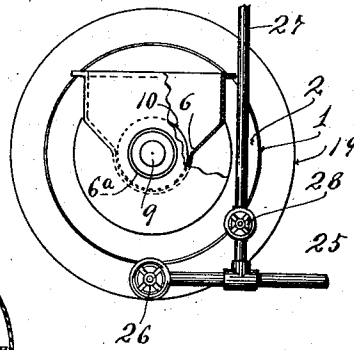


Fig. 5

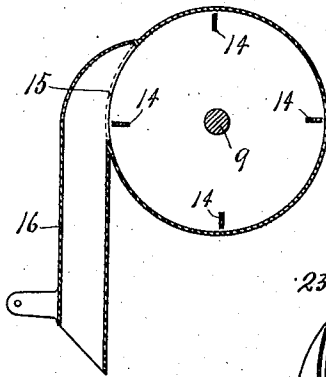


Fig. 3.

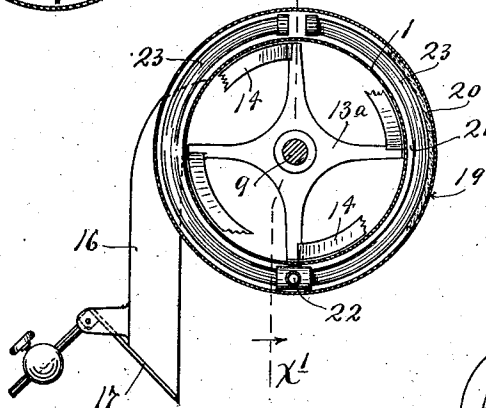


Fig. 6.

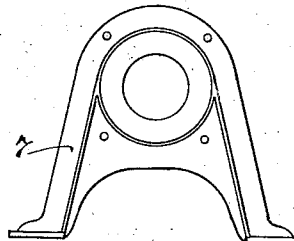
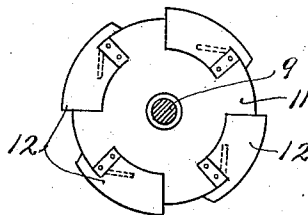


Fig. 4



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UNITED STATES PATENT OFFICE.

KENNEDY DOUGAN, OF MINNEAPOLIS, MINNESOTA.

WHEAT-STEAMER.

No. 891,468.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed November 14, 1906. Serial No. 343,383.

To all whom it may concern:

Be it known that I, KENNEDY DOUGAN, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Wheat-Steaming 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 apper-
tains to make and use the same.

My invention relates generally to wheat steamers wherein the wheat is steamed while passing a continuous stream from one device to another as, for instance, from an automatic feed governor to the rollers of a grinding machine.

More particularly stated, this invention relates to horizontal steamers of the general character disclosed and broadly claimed in my pending application S. N. 234,054, filed November 23, 1904, entitled "Wheat Steamer", in the device of which application the flow of the stream of wheat is regulated to a predetermined amount by an automatic feed device, and while the wheat is being steamed is fed through the steamer in a continuous stream by the devices which have a feeding capacity greatly in excess of that of the automatic feed governor and, hence, discharges the steamed wheat in a continuous stream at the same rate per unit of time that it is delivered by the automatic feed governor. Otherwise stated, the flow of the wheat is regulated entirely by the automatic feed governor, and the agitating and feeding devices within the steamer continue the feed of the wheat through the steamer and from the steamer at the same rate that it is introduced into the steamer, regardless of the amount of wheat per unit of time introduced in the steamer by said automatic feed governor.

This invention is directed particularly to the improvement of steamers of this type and has for its particular object to improve the same in the several particulars herein-after noted. The invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

The invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a view principally in vertical section, on the line $x^1 x^1$ of Fig. 3, with some parts in diagram and some parts in full, showing a steamer or steaming apparatus embodying my present invention. Fig. 2 is a right end elevation of the steamer shown in Fig. 1, with the automatic feed governor and certain other parts being removed and some parts being broken away. Fig. 3 is a vertical section taken on the line $x^3 x^3$ of Fig. 1. Fig. 4 is a detail in section, taken on the line $x^4 x^4$ of Fig. 1. Fig. 5 is a transverse vertical section taken on the line $x^5 x^5$ of Fig. 1; and Fig. 6 is a detail in elevation, showing one of the supporting brackets for the case or shell of the steamer.

The shell or case of the steamer is preferably made up chiefly of a long horizontally disposed imperforate sheet metal cylinder 1, which at its receiving end has a fixed head 2 and at its delivery end has a fixed head 3, the latter of which is preferably formed with a rigidly secured laterally offset inner plate 3^a. The head 3 has a central bearing sleeve 4.

The head is provided with a large axial inlet passage 5, into which leads the open inner end of the trough-like bottom of a long feed hopper 6. The closed outer end of the hopper 6 is rigidly secured to one of a pair of supporting brackets 7, the other of which brackets is rigidly secured to the other fixed head 3. These brackets 7 are adapted to be thus secured with their feet portions extended either downward, upward or to either side, and thereby serve to support the casing and hopper either from a floor, from a ceiling or from a wall. Any other suitable supplemental supporting device may, of course, be employed for supporting the casing and hopper of the steamer, and for that matter, the said casing and hopper may be supported entirely by any suitable means.

The wheat is preferably supplied to the hopper 6, as above indicated, from an automatic feed governor or regulator, and the feed device which I prefer to employ is that known to the trade as the "Columbian first break feed governor", and which governor is manufactured under and in accordance with U. S. Letters Patent #504,125, issued to me of date August 29, 1903, entitled "Automatic feed regulator", and #558,900, issued to me of date April 21, 1906, entitled "Governor for feed regulator". This automatic governor or regulator is diagrammatically indi-

cated in the drawings, and is designated as an entirety by the numeral 8. Extended axially through the casing 1, and longitudinally through the bottom of the feed hopper 6, is a long feed shaft 9 that is journaled in the bearing 4 of the head 3 and in a bearing 6^a on the outer head or end plate of said hopper 6. Of course, the said shaft also extends axially through the grain inlet passage 5 to the casing 1. That portion of the shaft 9 that extends through the lower portion of the feed hopper 6 is provided with a spiral feed blade 10, the inner end of which terminates in the inlet passage 5. This spiral feed blade or worm 10 constitutes what may be designated as a feed device to the steamer, or as a secondary feed device with respect to the automatic feed governor. Secured to the shaft 9 just inward of the casing head 2 and inlet passage 5, is a deflecting disk 11, the periphery of which is spaced apart from the casing 1 and is provided with obliquely set propeller blades 12, the important function of which will be hereinafter described. The inner portions of these propeller blades 12 extend for some distance radially along the inner surface of the disk 11, while the outer portions thereof extend outward of and obliquely across the peripheral portion of said disk.

Inward of the deflecting disk 11, the shaft 9 is provided with a spider bracket 13, and a short distance inward from the head 3 the said shaft is provided with a second but similar spider bracket 13^a. To the arms of the spider brackets 13 and 13^a are secured long spiral agitating blades 14. The said blades 14 extend nearly from end to end of the casing 1 and, as shown, each extends spirally through 180 degrees. They are arranged to work close to the inner surface of the casing 1 and are given spiral travel in the same direction as the spiral feed blade 10, so that when the shaft 9 is rotated in the direction of the arrows marked thereon in Fig. 1, the grain will be advanced in a direction from right toward the left, or from the receiving toward the delivery end of the casing. At its delivery end, the casing 1 is provided with a peripheral outlet or discharge passage 15 which opens into a depending discharge spout 16. The lower end of the spout 16 is normally closed by a weighted valve or gate 17 that opens under pressure of accumulated grain within the spout. Motion may be imparted to the shaft 9 by a power driven belt (not shown) which will run over a pulley 18 on one end of said shaft.

Surrounding the main body portion of the casing 1 is a supplemental outer casing 19 that is preferably lined with a sheet of asbestos 20. Extending longitudinally through the lowermost portion of the annular chamber 21 formed between the casings 1 and 19 is an approximately horizontal steam-conducting

pipe 22 that is provided with a plurality of laterally spaced annular branch pipes 23. The lower portions of the several annular branch pipes 23 open directly into the supply pipe 22, so that any water condensed from the steam may run directly into said pipe 22. This construction is important because it permits complete draining of all of the heating pipes that are within the chamber 21 and, hence, prevents bursting of the pipes by freezing in cold weather. The numeral 24 indicates a drain pipe which, as shown, extends from the delivery end of the horizontal steam pipe 22 to any suitable point, and is preferably provided with a valve (not shown) for opening and closing the same.

Live steam from a suitable source, such as a boiler, (not shown) is conveyed to the outer end of the pipe 22 through a pipe 25, and a valve 26 is preferably applied to the outer end of the said pipe 22. Steam is introduced into the upper portion of the receiving end of the casing 1 through a pipe 27 which, as shown, leads from the steam supply pipe 25 and is preferably provided with a valve 28.

In the treatment of wheat in the so-called "steamer" it is frequently desirable to apply water thereto and, hence, I provide a water supplying device which, as shown, comprises an elevated hopper 29 that is connected to the delivery portion of the pipe 27 by a pipe 30. The pipe 30 is provided with a valve 31 which is, of course, closed when a supply of water within the steamer is not desired. The numeral 32 indicates a water supply pipe which leads from a suitable source of water supply (not shown) and delivers into the hopper 29.

The operation of the apparatus described is substantially as follows: The wheat is supplied to the hopper 6 from the automatic feed governor 8 in the predetermined desired (but variable at will) amount per unit of time and in an even stream, and by the action of the spiral feed blade or worm 10 is fed, as fast as it is received thereby, through the inlet passage 5 and into the inner end of the casing 1, but is thrown against the deflecting disk or plate 11, and by the latter is prevented from passing axially into the said casing. The grain delivered against the said deflecting disk 11 will be precipitated to the bottom of the casing and by the oblique propelling blades 12 will be thrown into the "reel containing" compartment or portion of said casing, where it will be engaged by the rapidly rotating reel and carried toward the delivery end of the casing and finally out through the peripheral outlet passage 15, under centrifugal force, and into the discharge spout 16, from whence it may be delivered either directly or indirectly to the grinder. When the grain passes into the casing and becomes subject to the rapidly rotating spiral reel, it will be caused to rotate around the axis of

the reel and under the action of centrifugal force will be spread out in a thin sheet over the inner surface of the cylindrical casing, so that each grain or particle of wheat may be completely enveloped with steam. This insures thorough and even steaming or dampening of the grain and, hence, for that reason is, of course, a very important feature.

The heat radiated into the casing from the pipe 22 and annular branch pipes 23 will apply more or less additional heat to the grain and, furthermore, will greatly delay the condensation of live steam within the casing of the steamer. The escape of live steam from the outlet passage 15 and thence through the discharge spout 16 is prevented by a small body of wheat which is constantly maintained within the said spout, under the action of the weighted valve 17. The steam pressure within the casing of the steamer is, of course, very low and in fact, under the action of centrifugal force produced by the rapidly rotating reel, an increasing pressure is produced in the vicinity of the inner surface of the shell, while the pressure at the axis of the shell is reduced and may, in some instances, even be below atmospheric pressure.

An escape of steam through the inlet passage 5 and into the automatic feed governor would not only be wasteful, but would be very detrimental to the action of the governor.

In some prior devices it has been attempted to maintain a sealed inlet passage by an accumulation of wheat or grain in such passage, but in practice it is found that inasmuch as no two feed devices can be adjusted to operate with exactly the same feeding action and, hence, that the secondary feed device would either operate too slowly, in which case the grain would back up and interfere with the action of the automatic feed governor; or the said secondary feed device would operate too fast, in which case an accumulation of grain would not be maintained in the inlet passage and, hence, the said inlet passage would not be sealed against the escape of steam. Also, weighted valves have been employed in the inlet passages, but such feed devices are very unsatisfactory because of the well known irregularity in the operation of such valves. In this preferred form of my improved steamer, the propeller blades 12 operate as a fan or blower and produce an air pressure between the periphery of the disk 11 and the shell 1, and in a direction away from the inlet passage 5, sufficient to overcome the light pressure of steam within the casing, and thereby prevent the escape of steam outward through the said inlet passage. This is a very important feature.

The arrangement of the valve steam supply pipe and of the valve water supply pipe

into the casing of the steamer, makes it possible, at will, either to supply steam only to the casing, water only to the casing, or the desired amount of water to be commingled with the steam. It frequently happens in steaming wheat or other grain, that the moisture of the steam is not sufficient to properly dampen the grain.

What I claim is:

1. In an apparatus of the kind described, the combination with a casing having an inlet passage and an outlet passage, of means for delivering the grain into said casing, means for introducing steam into said casing and a fan or blower within said casing adjacent to said inlet passage arranged to produce an inward pressure and prevent the escape of live steam through said inlet passage, substantially as described.

2. In an apparatus of the kind described, the combination with a casing having an inlet passage and an outlet passage, of a feed device for delivering grain into said casing through said inlet passage, means within said casing for spreading the grain and feeding the same from the receiving toward the delivery end of said casing, means for introducing steam into said casing, and a fan or blower within said casing adjacent to said inlet passage arranged to produce an inward pressure and prevent the escape of steam from said casing through said inlet passage, substantially as described.

3. In an apparatus of the kind described, the combination with an approximately horizontal casing having an axial inlet passage at one end and a suitable outlet passage at its other end, of a conveyer arranged to deliver grain into said casing through said axial inlet passage, means within said casing for spreading the grain and feeding the same from the receiving toward the delivery end thereof, means for delivering steam into said casing, a deflecting disk or plate within said casing, adjacent to said axial inlet passage, but spaced at its peripheral portion inward of the shell of said casing, and revolving propeller blades arranged to work in the vicinity of the periphery of said deflecting plate, to feed the grain and to produce an inward pressure, preventing the escape of steam from said casing through said inlet passage, substantially as described.

4. In an apparatus of the kind described, the combination with an approximately horizontal cylindrical casing having an axial inlet passage at one end and a peripheral outlet passage at its other end, of a hopper opening at one end to the said axial inlet passage, a rotary shaft extended axially through said casing, inlet passage and hopper, a spiral feed blade on said shaft arranged to deliver grain through said inlet passage, a spiral reel within said casing, carried by said shaft, a deflecting disk carried

by said shaft within said casing adjacent to said inlet passage, oblique propelling blades carried by the peripheral portion of said deflecting disk, and means for introducing
5 steam into said casing, substantially as described.

5. The combination with a feed governor and the casing of a steamer, said casing having an inlet passage at one end and an outlet
10 passage at its other end, of a secondary feed device receiving from said feed governor and delivering through the inlet passage of said casing, a spiral reel working within said casing, a fan or blower within said casing
15 arranged to produce an inward pressure preventing the escape of steam from said casing through said inlet passage, and means for introducing steam into said casing, substantially as described.

20 6. In an apparatus of the kind described, the combination with an approximately horizontal casing having an inlet passage at

one end and an outlet passage at its other end, and provided with an annular chamber surrounding the intermediate body portion 25 thereof, of means within said casing for agitating and feeding the grain from the receiving toward the delivery end thereof, an approximately horizontal steam pipe extending longitudinally through the lowermost 30 portion of the annular chamber surrounding said casing, and a plurality of annular branch pipes within said annular chamber surrounding said casing and opening at their lower portions into the said horizontal steam 35 pipe, substantially as and for the purposes set forth.

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

KENNEDY DOUGAN.

Witnesses:

MALIE HOEL,
F. D. MERCHANT.