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EXPANDING TOBACCO

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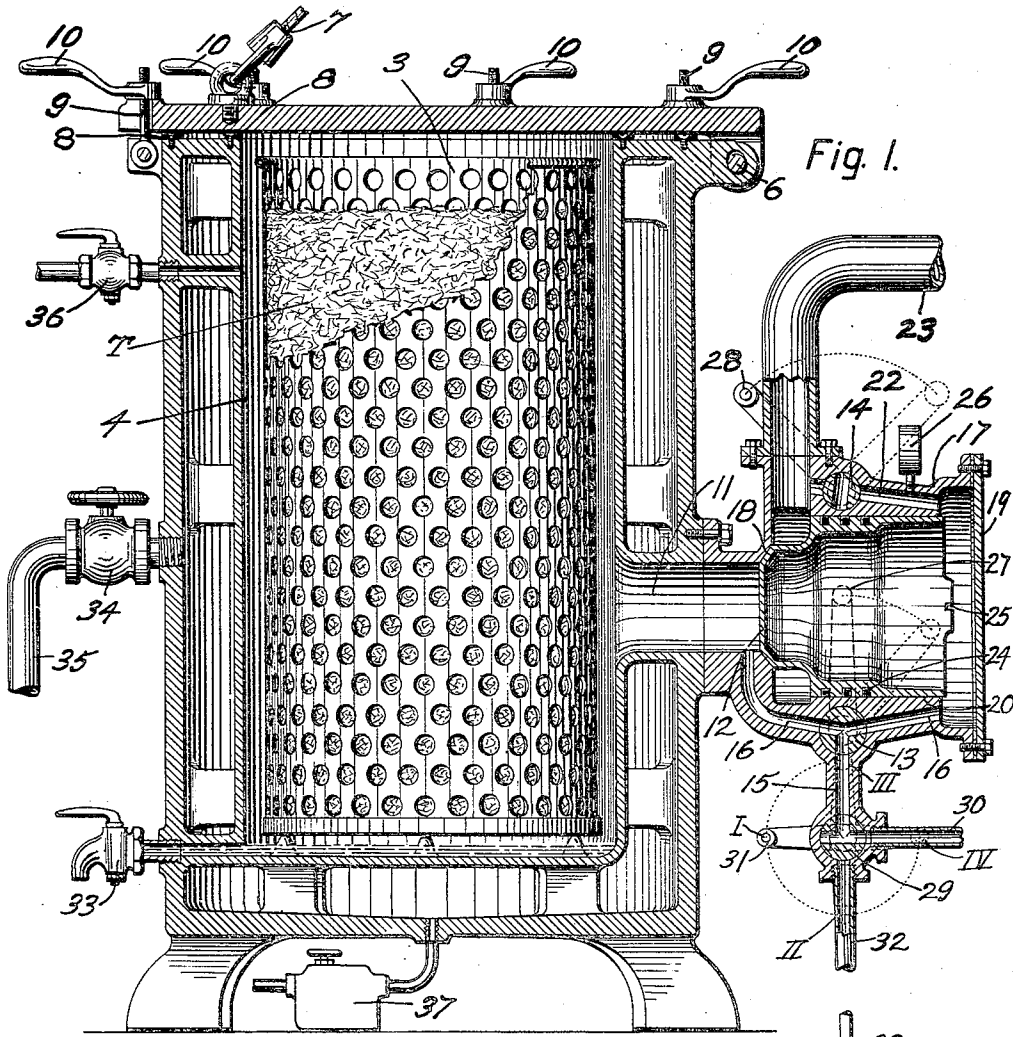
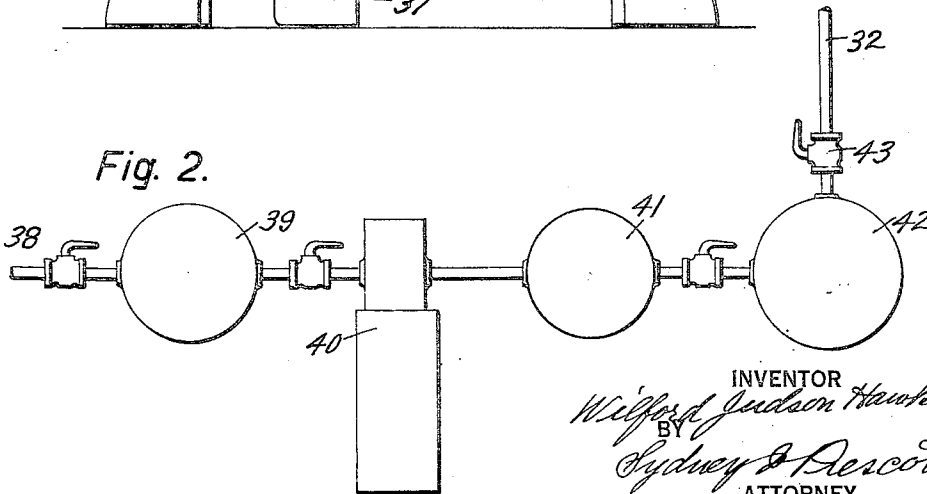


Fig. 2.



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EXPANDING TOBACCO

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This invention relates to the expanding of tobacco.

During the process of curing tobacco, a large percentage of the weight of the green tobacco is lost, because the fluid part of its contents dries out and disappears, and the tobacco shrinks, thus decreasing its volume. This shrinkage represents a distinct volumetric loss which, heretofore, could not be overcome or even decreased.

I have discovered that the volume of cured tobacco can be increased, in the interest of manufacturing economy and improved product, by conditioning cured tobacco in the usual manner to make it soft and pliable and therefore workable without breakage, then subjecting the cured and conditioned tobacco to the action of a suitable gas, such for example as air, carbon dioxide, steam, or the like, under pressure for a limited time, that is, until the gas penetrates the constituents of the tobacco, then suddenly releasing the pressure, so that the gas trapped under pressure within some of the constituents will expand them to or toward their original volume as the confined gas slowly escapes through the pores of said constituents until the pressure within them equals the atmospheric pressure outside of the same and a balance of pressure results which permits the constituents to remain in expanded condition.

I have further discovered that heating the gas to a limited extent facilitates the constituent expanding process, by converting the conditioning moisture into steam to further increase the volume of the tobacco and thus decrease the volume necessary for certain given purposes, such for example as for manufacture into cigars, cigarettes, etc.

I have further discovered that the cured tobacco may be flavored, or further conditioned, or otherwise treated, during the operation of the volume increasing process, by introducing the treating medium with the penetrating gas used.

The production of such expanded tobacco, and of a method of and apparatus for producing the same, constitute the main object of the invention. With this and other objects not specifically mentioned in view, the invention is necessarily of a ternary character, involving not only the creation of a new and useful product, but also a new method and a new apparatus for making said product, all of which will be hereinafter fully described and then defined in the claims hereunto appended.

Generally speaking, the invention resembles in some respects that created for the purpose of cooking and expanding or "puffing" rice and wheat, and disclosed in the patent to Anderson, No. 707,892, granted August 26, 1902. But in other very essential respects it differs materially therefrom. Unlike rice and wheat, tobacco cannot be successfully treated when in an "air-dry" condition, for the reason that it is then so brittle that it readily breaks up into highly undesirable small pieces. Moreover, it must not be cooked like rice and wheat, because that would destroy the flavor and aroma wherein lies its value. It cannot be expanded to the same extent as rice or wheat, because it lacks the large quantity of starch which is contained and expanded in the grain. Independent analyses made in three tobacco manufacturing countries show that of ten different kinds of tobacco grown in widely separated parts of the world, only four contain starch and saccharine matter and these only in small quantities, while all kinds of tobacco contain in varying percentages nicotine, mallic acid, citric acid, oxalic acid, acetic acid, tannic acid, pectic acid, nitric acid (except Chinese tobacco), cellulose, ammonia, albuminoids, resins, chlorophyll, fatty matter, soluble matter rich in nitrogen, indefinite soluble matter, and mineral matter. Of these twenty substances or constituents, only the cellulose and albuminoids appear to be ex-

panded in increasing the volume of cured tobacco from 5 to 15%. The percentage may be increased slightly in the cases of Virginia Bright, Turkish, Latakian, and Chinese tobaccos, these being the four kinds which contain starch and saccharine matter. In all cases, the extent of the expansion varies with variations of the nature of the tobacco treated, and of the temperatures, pressures, and lengths of treatment used. The most satisfactory results thus far obtained have been secured by subjecting the cured and conditioned tobacco for about 45 minutes to the action of air heated to about 110° C. and under about 20 lbs. pressure, then suddenly releasing the pressure. This treatment yields about 15% volumetric increase, and a corresponding decrease of cost of tobacco manufactured, less of course the slight cost of the treatment.

In the accompanying drawings which form a part of this specification and in which like characters of reference indicate the same or like parts, Fig. 1 is a sectional elevation of a treating chamber, showing the arrangement of the automatic piston valve which is used to suddenly release the pressure in the treating chamber; and Fig. 2 is a diagram, on a reduced scale, illustrating apparatus of well known kind and operation used for various combination treatments.

In carrying the invention into effect, cured and conditioned tobacco, either in leaf or cut form, is subjected to the action of a suitable gas under pressure to cause the gas to penetrate the constituents of the tobacco that are capable of expansion, and then suddenly releasing the pressure to permit the gas trapped in the constituents to expand the same, and to hold them in expanded condition. In the best practice of the invention, the gas is heated to facilitate the process, though not enough to cook the tobacco and destroy its flavor and aroma. In the best practice also, a tobacco treating medium is introduced into the constituents with the gas employed; and air at about 110° C. and under about 20 lbs. pressure and employed for about 45 minutes, is used.

The apparatus employed in carrying the new method into effect includes a chamber, a removable tobacco container located in said chamber and spaced from its walls, means for filling said chamber with gas under pressure, and means for suddenly releasing the pressure. In the best constructions contemplated, there is also employed means for heating the chamber to heat the gas used; the filling and releasing means are valve controlled and include an automatic relief valve operating to instantly release the pressure at the proper time.

The steps of the method and the devices of the apparatus may be widely varied in the practice of the invention, within the scope

of the claims. The invention, therefore, is not to be restricted to the precise details of the method steps or the apparatus devices.

Referring to the drawings: The tobacco T to be treated is placed in a perforated container 3 which is set into a jacketed treating chamber 4 having a steam tight cover 5 connected thereto by means of a hinge 6. The container 3 is spaced from the wall of the chamber 4, to enable the gas to reach all parts of the surface of the container with equal facility. The cover 5 is, or may be, balanced by a counterweight suspended from a chain or rope 7 attached to the cover and running over a pulley not shown but secured overhead, as to a beam. The top of the chamber 4 carries a gasket 8 on which the cover 5 is forced by hinged bolts 9 having nuts 10.

The chamber 4 has an inlet port 11 which is closed during tobacco treatment by means of an automatic piston valve 12, the latter being controlled by an inlet valve 13 and an outlet valve 14. Gas is admitted into the chamber 4 through an inlet pipe 15 and the valve 13, and it flows through both ends of the passage 16 to reach both sides of the piston valve 12. The piston valve 12 is slidable in a housing 17 between the valve seat 18 and the housing cover 19. The bore 20 of the housing 17 is larger than the valve seat 18, so that with equal pressure on both sides of the piston valve 12, the latter will be forced by the differential pressure against the valve seat 18. When, at the end of a treating operation, it is desired to suddenly release the pressure in the chamber 4, the inlet valve 13 is closed and the outlet valve 14 is opened. This permits the gas behind the piston valve 12 to escape through the passage 22 into the outlet pipe 23 and thence to the atmosphere. When this occurs, the pressure behind the piston valve 12 disappears and the back pressure of the gas trapped in the chamber 4 instantly unseats the piston valve 12 from the seat 18, because there is then no resisting differential pressure holding the piston valve closed. The gas escaping past the seat 18 flows into the outlet pipe 23 and thence to the atmosphere.

The piston valve 12 is provided with piston rings 24 and with slots 25 to receive a spanner wrench for grinding the seat 18. Into the top of the housing 17 is inserted a pressure gauge 26, of well known construction and operation. The valves 13 and 14 have handles 27 and 28 respectively, by means of which each may in turn, as required, be thrown into either of its operating positions as shown by dotted lines in Fig. 1.

A three-way valve 29 is provided in the inlet 15 that has a diametral and a radial port at right angles to and communicating with each other so that gas under the desired pressure may be admitted through the pipe 30 (position I of handle 31), or some treating medium through the pipe 32 (position II),

or both gas and treating medium at the same time (position III), or the valve 29 may be placed with its diametral port horizontal (position IV) whereby the inlet pipe 15 is closed and, with the valve 13 open, the air or gas in the chamber 4 will be in open communication through the passage 16 with the gas at the rear of the piston valve 12.

A drain cock 33 serves to drain the chamber 4 after treatment, if required. A valve 34 admits steam from a pipe 35 into the jacket space surrounding the chamber 4, to heat said chamber and the gas contained therein to the proper temperature. Gas burners or electric heaters may be used for this purpose, however, if desired. A valve 36 is connected with the wall of the chamber 4, and by means thereof, and a connected suction pump not shown, the chamber may be exhausted before applying the treatment, when desired. A steam trap 37 is provided by means of which water of condensation may be carried off from the steam jacket.

In Fig. 2 is diagrammatically shown the connection for various apparatus of well known construction and operation which may be employed. 39 indicates an air washer. Into this washer, air and the treating medium such as flavoring, etc., is introduced through the valve 38. The fluid from the washer 39 passes to a compressor 40 in which it is compressed, and from which it flows through a cooler 41 into a reservoir 42 where it is stored until used. To the reservoir 42 is connected the inlet pipe 32 shown in Fig. 1, and outflow from the reservoir 42 is controlled by a valve 43. It is to be understood that the fluid flowing from the reservoir may be directed into a manifold from which it flows to a plurality of chambers when a battery of such chambers is employed.

The operation of the apparatus just described is as follows: With the inlet valve closed, the container 3 with its charge of tobacco to be treated is inserted in the chamber 4, and the cover of the latter is closed and clamped down tightly. Next, the outlet valve 14 is closed and the inlet valve 13 is opened, except when the expanding operation is being combined with tobacco treatment in which the presence of air in the chamber 4 is objectionable, in which case, the valve 36 is opened after closing the valve 14 and before opening the valve 13, and a suction pump connected to the valve 36 is operated to exhaust the air from the chamber 4, after which the valve 36 is closed and the valve 13 is opened. The compressor 40 having in the meantime raised the treating medium to the desired pressure, the valve 43 is opened and the air and treating medium is allowed to enter the chamber 4 through the pipe 32 and valve 29. After holding the working pressure for the proper time, the inlet valve 13 is closed and the outlet valve is opened to instantly release the pressure,

whereupon the cover 5 is raised and the container 3 removed from the chamber 4.

It is to be understood that when no treatment other than constituent expansion is desired, the air employed flows from a suitable source of supply, not shown, where it is under the required pressure, through the pipe 30 and valve 29 into the pipe 15 and passage 16, and that the closing of the valve 13 at the end of a period of treatment cuts off the supply without actuation of the valve 29.

What is claimed is:

1. Cured tobacco having gas expanded constituents.
2. The method of expanding constituents of cured and conditioned tobacco, wherein the tobacco is subjected to the action of a suitable gas under pressure to cause the gas to penetrate said constituents, and then suddenly relieved of the pressure.
3. The method of expanding constituents of cured and conditioned tobacco, wherein the tobacco is subjected to the action of a suitable gas under pressure and carrying a tobacco treating medium to cause said gas and medium to penetrate said constituents, and then suddenly relieved of the pressure.
4. The method of expanding constituents of cured and conditioned tobacco, wherein the tobacco is subjected to the action of a suitable gas under pressure and heated to about 110° C. to cause the gas to penetrate said constituents, and then suddenly relieved of the pressure.
5. The method of expanding constituents of cured and conditioned tobacco, wherein the tobacco is subjected to the action of a suitable gas under about 20 pounds pressure to cause the gas to penetrate said constituents, and then suddenly relieved of the pressure.
6. The method of expanding constituents of cured and conditioned tobacco, wherein the tobacco is subjected to the action of air under pressure to cause the air to penetrate said constituents, and then suddenly relieved of the pressure.
7. The method of expanding constituents of cured and conditioned tobacco, wherein the tobacco is subjected to the action of air under about 20 pounds pressure and heated to about 110° C. for about 45 minutes to cause said air to penetrate said constituents, and then suddenly relieved of the pressure.
8. Apparatus for increasing the volume of cured and conditioned tobacco, comprising a chamber, a removable tobacco container in said chamber and spaced from its walls, means for filling said chamber with gas under pressure, and means for suddenly releasing the pressure.
9. Apparatus for increasing the volume of cured and conditioned tobacco, comprising a chamber, a removable tobacco container in said chamber and spaced from its walls, means for filling said chamber with gas un-

der pressure, and means for suddenly releasing the pressure, said filling means being valve controlled.

10. Apparatus for increasing the volume of cured and conditioned tobacco, comprising
5 a chamber, a removable tobacco container in said chamber and spaced from its walls, means for filling said chamber with gas under pressure, and means for suddenly releasing
10 the pressure, said releasing means being valve controlled.

11. Apparatus for increasing the volume of cured and conditioned tobacco, comprising
15 a chamber, a removable tobacco container in said chamber and spaced from its walls, means for filling said chamber with gas under pressure, and means for suddenly releasing
20 the pressure, said releasing means including a quick-acting automatic relief valve and hand-actuated valve mechanism controlling the action of said relief valve.

12. Apparatus for increasing the volume of cured and conditioned tobacco, comprising
25 a chamber, a removable tobacco container in said chamber and spaced from its walls, means for filling said chamber with gas under pressure, and means for suddenly releasing
the pressure, said chamber and said container being cylindrical.

13. Apparatus for increasing the volume of cured and conditioned tobacco, comprising
30 a chamber, a removable tobacco container in said chamber and spaced from its walls, means for filling said chamber with gas under pressure, and means for suddenly releasing
35 the pressure, said container being perforated to permit the gas to flow freely into the container at many points.

14. Apparatus for increasing the volume
40 of cured and conditioned tobacco, comprising a chamber, a removable tobacco container in said chamber and spaced from its walls, means for filling said chamber with gas under pressure, and means for suddenly releasing
45 the pressure, said chamber being heat jacketed to cause it to heat the gas.

15. Apparatus for increasing the volume of cured and conditioned tobacco, comprising
50 a chamber, a removable tobacco container in said chamber and spaced from its walls, means for filling said chamber with gas under pressure, means for suddenly releasing the pressure, and means for introducing into
said chamber a tobacco treating medium.

16. Apparatus for increasing the volume of cured and conditioned tobacco, comprising
55 a chamber, a removable tobacco container in said chamber and spaced from its walls, means for filling said chamber with gas under pressure, means for suddenly releasing
60 the pressure, and means for washing and compressing and introducing into said chamber a tobacco treating medium.

17. Apparatus for increasing the volume
65 of cured and conditioned tobacco, comprising

ing a chamber, a removable tobacco container in said chamber and spaced from its walls, means for filling said chamber with gas under pressure, means for suddenly releasing the pressure, and means connected
70 with said chamber whereby it may be exhausted.

In testimony whereof, I have signed my name to this specification.

WILFORD JUDSON HAWKINS.

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