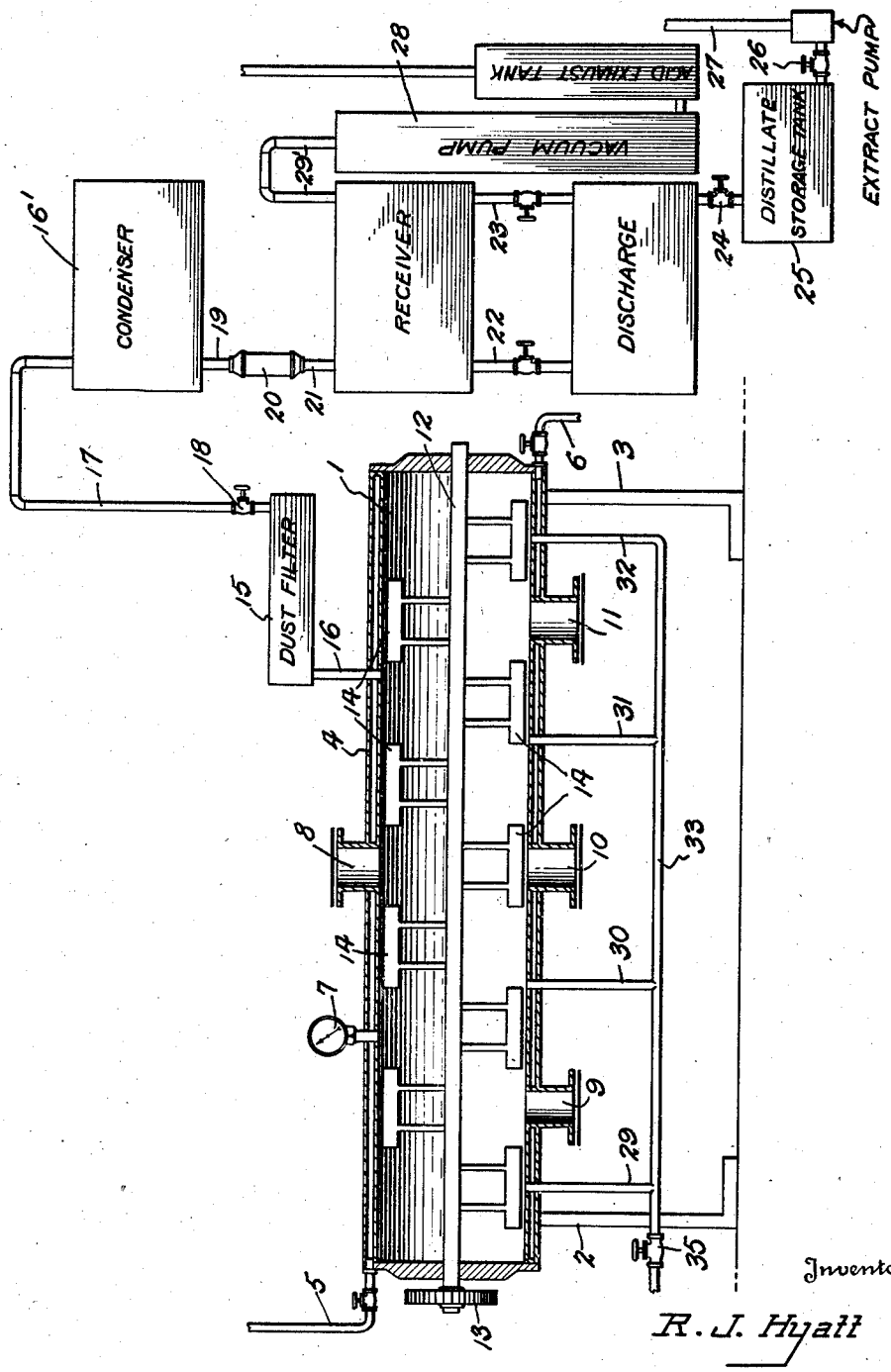
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PROCESS FOR EXTRACTING NICOTINE FROM TOBACCO

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PROCESS FOR EXTRACTING NICOTINE FROM TOBACCO

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3 Claims. (Cl. 87—28)

This invention relates generally to processes for extracting nicotine and other volatile constituents of tobacco from tobacco wastes, such as stocks, stems, and low grade leaves.

The main object of the invention is to provide a process to reduce the costs of extraction of nicotine from tobacco wastes, and to increase the rate of extraction and percentage of recovery from such wastes.

In carrying out this process of extraction, the raw tobacco wastes are dried and ground, and otherwise reduced to a finely divided condition, in order to expedite the chemical reactions involved in the practice of the process. This finely divided material is then mixed to saturation with an aqueous solution of soda; or is treated in any of the well-known methods with an alkali, such as hydrated lime, to free the nicotine from the other constituents of the tobacco waste.

Preferably, the weight of the water used in the preliminary saturation is about equal to the weight of the tobacco waste undergoing treatment, and the lime should be about ten percent of the weight of the tobacco wastes. The saturated alkaline mixture is then charged into a drier, which may be a horizontal cylinder provided with the usual dry blender agitator. Heat is applied to the drier by a steam jacket, and the beaters are set in operation to effect a thorough mixture of the saturated alkaline wastes and to vaporize the nicotine freed from such wastes. After a short period of this heating operation, the nicotine-saturated vapor is withdrawn from the drier through a dust filter to a condenser by means of a vacuum pump.

The condensing operation is continued so long as liquid nicotine extract is disclosed as flowing from the condenser toward a receiver forming part of the storage system. When the sight glass connecting the condenser and receiver shows that no more nicotine is flowing from the condenser to the receiver, the connection between the condenser and drier is closed.

Obviously, the interior of the drier, originally under atmospheric pressure, is then under vacuum. In this condition, most of the cells of the tobacco waste in the drier have been exploded and have parted with their nicotine contents. However, many of such cells have not given up their nicotine content. In order to complete the extraction, the vacuum in the drier is broken as rapidly as possible to restore the pressure therein to at least atmospheric pressure. This increased pressure causes the unexploded cells to collapse. Just as soon as the pressure gauge indicates that the interior of the drier has again reached atmospheric pressure, the drier is closed and the connection to the vacuum pump is again restored.

The effect of the suction applied by the vacuum pump again causes expansion of the unexploded collapsed nicotine cells, and causes more of the cells to rupture and part with their nicotine contents to the superheated steam already in the drier. This connection to the vacuum system is continued, so long as the sight glass at the output end of the condenser discloses the passage of nicotine to the storage mechanism. When the sight glass discloses that the extraction of nicotine at this stage has been completed, the vacuum system is again disconnected, and the vacuum in the drier again broken by the injection of steam thereinto. This subjection of the drier repeatedly to make and break the action of a vacuum, is continued until all the nicotine possible to be extracted from the waste has been extracted, as determined by inspection of the condenser sight glass, after each application of the vacuum pump to the drier.

In carrying out of this process, it is essential, that the heat applied to the jackets of the driers and to the interior of the drier by the vacuum break system, shall be great enough to prevent condensation in the drier. This evidently means that the steam used for the vacuum break must itself be dry and be of a temperature sufficient to prevent condensation in the heated drier.

The apparatus for carrying out this extraction process is illustrated diagrammatically in the single figure of the drawings, in which the drier is shown in central longitudinal section connected through a dust filter to a condenser and distillate storage system, which, in turn, are assumed to be connected to scrubbers and separators which form no part of the present invention.

The drier comprises a substantially horizontal cylinder 1 supported on standards 2 and 3, and provided with a jacket 4, connected to a valve controlled system 5 for conducting steam to said jacket. A valve controlled outlet pipe 6 is connected to the lower part of the jacket for the purpose of draining the same whenever found necessary or desirable. A pressure gauge 7 is mounted on the cylinder to indicate the pressure of the interior thereof and a charging manhole 8 is provided at the upper part for the purpose of introducing the material to be acted upon or processed. The lower part of the cylinder is provided with a series of manholes 9, 10, and 11, to

permit the removal of the spent tobacco waste from the cylinders.

A beater shaft 12 is mounted to rotate in the cylinder and is provided at one of its ends with a gear 13 adapted to be connected to any suitable source of power to effect rotation of the shaft. A series of beater blades 14 are secured to the shaft 12 for the purpose of agitating and thoroughly mixing the alkalined and saturated tobacco wastes with which the cylinder is charged.

A dust filter 15 is connected at one end by a pipe 16 to the cylinder 1. The other end of the filter is connected to a condenser 16' by piping 17 controlled by a valve 18. The outlet end of the condenser 16' is connected by a pipe 19, sight glass 20 and a pipe 21 to a receiver, which in turn is connected through a valve 24 to a storage tank 25, the outlet of which is connected through a valve 26 to piping 27 leading to the usual scrubbers and separators referred to above. A vacuum pump 28 is connected by piping 29' to the upper end of the receiver, and is set in operation when dsired to draw the nicotine vapors from the drier 1, through the condenser 16' and the receiver into the discharge tank.

To effect the vacuum breaks in the drier 1 the latter is connected by a series of pipes 29, 30, 31, and 32 to a manifold 33 which is connected through a valve 35 to a source of dry superheated steam. This system is to be provided with as many pipes connected to the manifold as may be found necessary to effect substantially instantaneous break in the vacuum upon the operation of the valve 35. The heat imparted to the cylinder through the steam in the jacket 4 and through the superheated steam imparted thereto during the vacuum break through the valve 35, must be such as to prevent condensation of the vapors within the cylinder 1.

Upon the completion of the extraction of nicotine from the tobacco scrap, the dry finely divided tobacco residue is removed from the drier, in condition for use as a fertilizer, or as a base for stock feeds.

What I claim is:

1. The process of extracting nicotine from tobacco material which consists in mixing the material with an alkali, saturating the mixed material, heating the saturated mixture at atmospheric pressure to cause collapse of nicotine cells and to vaporize liquid contents of the mixture, reducing the pressure on the heated mixture to create a vacuum to effect expansion and rupture of the collapsed cells, condensing the vapors under said reduced pressure, restoring and reducing the pressure in alternation on the residue, and condensing the vapors from the residue after each reduction in pressure, each restoration of pressure being effected by breaking the vacuum with steam as suddenly as possible to cause collapse of unexploded cells in the heated and vaporized residue, and each reduction in pressure expanding and exploding the cells so collapsed.

2. The process of extracting nicotine from tobacco material which consists in mixing the material with an alkali, saturating the mixed material, heating the saturated mixture at pressure not less than atmospheric to cause collapse of nicotine cells and vaporize liquid contents of the mixture at a temperature sufficient to prevent condensation in the mixture, reducing the pressure on the heated mixture to create a vacuum and thereby effect expansion and rupture of the collapsed cells, condensing the vapors under the reduced pressure, restoring and reducing the pressure in alternation on the residue, while maintaining the latter at vaporizing temperature, and condensing the vapors from the residue after each reduction in pressure, each restoration of pressure being effected by breaking the vacuum with steam as suddenly as possible to cause collapse of the exploded cells in the heated and vaporized residue, and each reduction in pressure expanding and exploding the cells so collapsed.

3. The process of extracting nicotine from tobacco material which consists in mixing the material with an alkali saturating the mixed material, heating the saturated mixture at pressure not less than atmospheric to cause collapse of nicotine cells and vaporize liquid contents of the mixture at a temperature sufficient to prevent condensation in the mixture, reducing the pressure on the heated mixture to create a vacuum and thereby effect expansion and rupture of the collapsed cells, condensing the vapors under the reduced pressure, restoring and reducing the pressure in alternation on the residue, while maintaining the latter at vaporizing temperature, and condensing the vapors from the residue after each reduction in pressure, each restoration of pressure being effected by breaking the vacuum with steam as suddenly as possible to cause collapse of the exploded cells in the heated and vaporized residue, and each reduction in pressure expanding and exploding the cells so collapsed, the pressure variations being repeated in alternation until all the separable nicotine has been extracted from the material.

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