

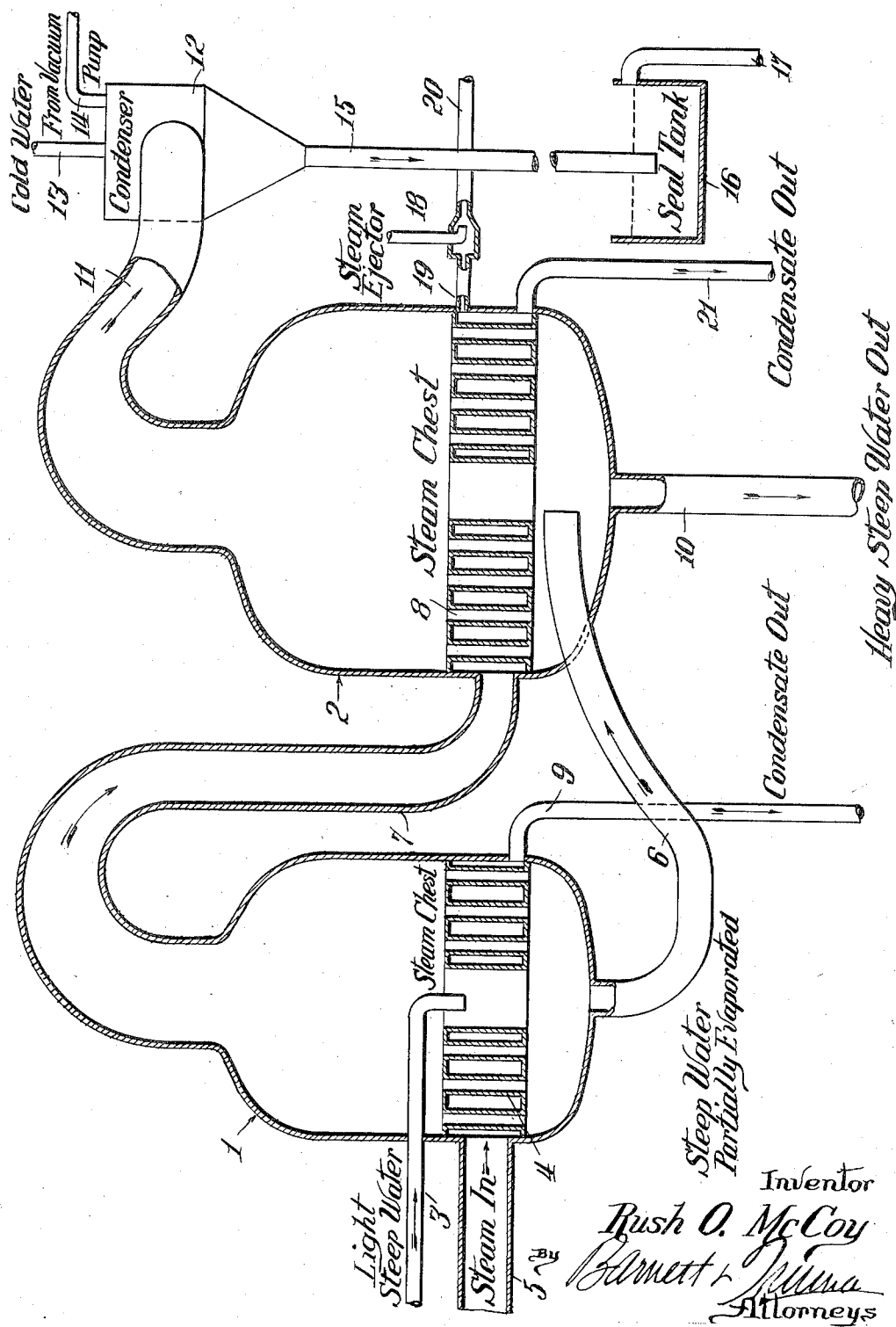
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EVAPORATION OF STEEP WATER

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EVAPORATION OF STEEP WATER

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3 Claims. (Cl. 127-68)

This invention relates to the evaporation of steep water in the manufacture of starch from corn; and the primary object of the invention is to reduce stream pollution by discharging from the evaporating apparatus volatile organic substances which have heretofore been run to the sewer with the condensate from the steep water pan or pans.

In the manufacture of starch from corn the first step is to steep the corn to soften it and to extract soluble substances. As these solubles are of value, it is customary to evaporate the steep water. This operation may be performed in either single or multiple effect evaporating apparatuses. The evaporation of the steep water vaporizes certain organic substances in the steep water and it has been customary to discharge such volatile organic substances with the condensate from the vacuum pan or pans. That is, these volatiles which are condensible pass with the condensate into the sewer through the down leg of the evaporating apparatus. This is objectionable as they bring about pollution of the water bodies into which the factory sewer discharges.

It has been discovered that where a multiple effect evaporating apparatus is used, a large proportion, probably about 80%, of the organic volatiles, are developed in the first unit of the apparatus. According to the present invention, which contemplates the use of an evaporating apparatus, comprising at least two units, with the vapors from the first unit conducted to the steam chest of the second, as is customary in multiple effect evaporating apparatus, the steep water volatiles going with the water vapor from the first unit to the steam chest of the second unit are ejected from the steam chest of the second unit through a vapor outlet separate from the outlet for the condensate. In this manner a large percentage of the polluting substances which formerly were sent to the sewer with the condensate are kept out of such condensate with the result that the condensate is relatively pure and innocuous and may be discharged into streams and lakes without appreciable polluting effect.

The invention is illustrated in the accompanying diagram of a multiple effect steep water evaporating apparatus comprising two units.

Referring to the drawing the first unit or vacuum pan is designated 1 and the second unit 2. Light steep water as it comes from the steeping system is introduced into the vacuum pan 1 through pipe 3. Steam enters the steam chest 4 of the vacuum pan 1 through pipe 5. The partially concentrated steep water passes through

pipe 6 to the vacuum pan 2. The vapors developed in the vacuum pan 1, including water vapor and probably about 80% or more of the volatilizable organic substances of the steep water, pass through pipe 7 to the steam chest 8 of the second effect 2. The condensate in steam chest 4 is discharged through pipe 9. The evaporated steep water is discharged from the second effect 2 through pipe 10. The vapors developed in the second unit 2, consisting almost entirely of water vapor, pass through pipe 11 to the usual condenser 12 into which condensing water is introduced through pipe 13 and which is connected by pipe 14 with the vacuum pump, not shown. The down leg 15 from condenser 12 extends into the usual seal tank 16 from which the condensate is discharged to the sewer through pipe 17.

Any suitable means may be used for discharging the organic volatiles from the steam chest 8 of the second effect. In the drawing is shown a steam ejector 18 connected at 19 with the steam chest and having a pipe 20 which discharges the volatiles to the atmosphere. The condensate is discharged from the steam chest through pipe 21.

It is the intention to cover all equivalents of the invention above described together with all modifications and variations thereof that are within the scope of the appended claims.

I claim:

1. In the process of evaporating steep water derived from the steeping of corn, in which process organic substances in the feed water are in part volatilized and from which condenser steam is discharged: the improvement which comprises discharging from the apparatus, through a channel separate from the channel or channels through which the condensed steam is discharged, the organic substances volatilized by the evaporating operation before condensation of such substances takes place so as to prevent stream pollution through discharge of the condensate.

2. Improved process of treating steep water derived from the steeping of corn which comprises: evaporating the steep water in multiple effect evaporating apparatus; introducing the vapor from one unit of the apparatus into the steam chest of the next unit; discharging condensed steam from said apparatus and discharging to the atmosphere from the steam chest of a succeeding unit organic substances volatilized by the evaporating operation before condensation of such substances takes place so as to prevent stream pollution through discharge of the condensate.

3. Improved process of treating steep water derived from the steeping of corn which comprises: evaporating the steep water in multiple effect evaporating apparatus in which the steam chest of the first unit is supplied with steam and that of the next unit with vapor from the first unit; and, ejecting from the steam chest of said

second unit, through a separate channel, organic substances volatilized in the first unit before condensation of such substances takes place, whereby stream pollution through discharge of the condensate from the second unit is prevented.

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