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APPARATUS FOR TREATING KELP CHAR, &c.

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1,258,321. **Patented Mar. 5, 1918.**

Fig. 1.

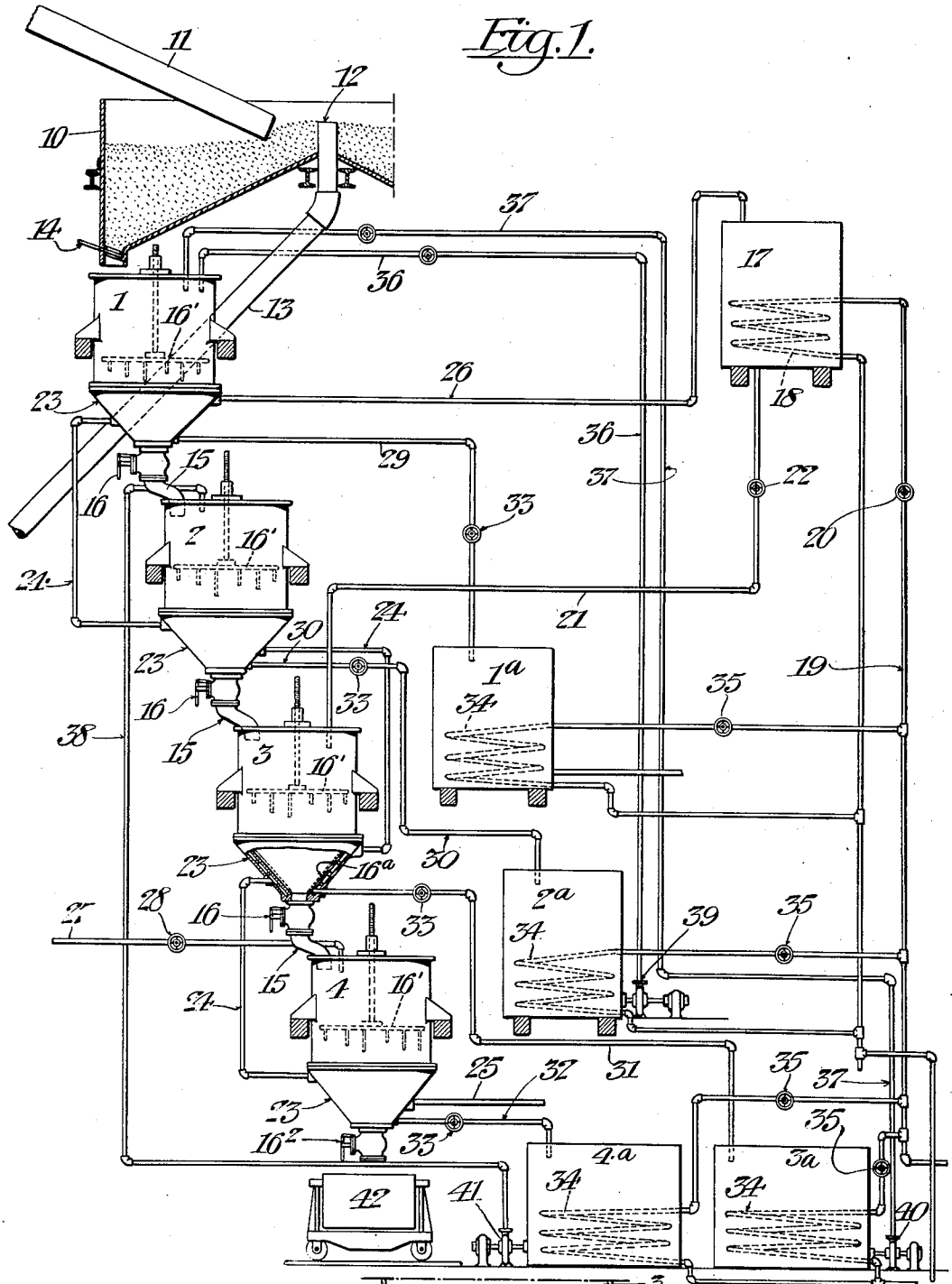
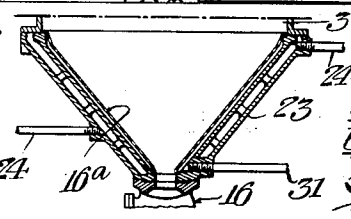


Fig. 2.



Witness:

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Inventors,

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UNITED STATES PATENT OFFICE.

FREDERICK VAN DYKE CRUSER, OF OSWEGO, AND OLIVER Z. HOWARD, OF NEW YORK, N. Y., ASSIGNORS TO THE DIAMOND MATCH COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

APPARATUS FOR TREATING KELP CHAR, &c.

1,258,321. Specification of Letters Patent. **Patented Mar. 5, 1918.**

Application filed September 14, 1916. Serial No. 120,012.

To all whom it may concern:

Be it known that we, FREDERICK VAN DYKE CRUSER, a resident of the city and county of Oswego and State of New York, and OLIVER Z. HOWARD, a resident of the city and county of New York and State of New York, both citizens of the United States, have invented certain new and useful Improvements in Apparatus for Treating Kelp Char, &c., of which the following is a specification.

This invention relates to an apparatus for treating kelp char and analogous substance for the extraction more especially of the soluble salts therefrom. The apparatus has been designed more particularly for use in the performance of the process forming the subject of an application for Letters Patent of the United States filed August 10, 1916 by Frederick V. D. Cruser under Serial No. 114,119; which process, briefly described, comprises subjecting each of a series of batches of char to a succession of liquid extraction treatments.

Our invention, generally stated, embodies, in a leaching apparatus, a series of extractors, and complementary storage vessels for the solutions obtained in the extractors, together with the requisite connections and appurtenances for the extractors and storage vessels, as will be hereinafter described and claimed.

In the drawings—

Figure 1 is an elevation, partly in section, of an apparatus embodying a preferred form of our invention.

Fig. 2 is an enlarged section of the draining and discharging portion of an extractor.

Referring to the drawings, 10 designates a hopper to which the kelp char or analogous substance is delivered by means of a chute 11, for example, from a furnace or other suitable source of char supply. Within the hopper is an upright overflow pipe 12 which communicates by means of a conduit 13 with a suitably-located storage bin. The throat of the hopper is provided with a slide gate 14 which can be manually operated to permit the ready discharge of predetermined quantities of char from the hopper into a directly underlying extraction vat as will hereinafter appear. This vat is one of a series. In the present instance, we have illustrated four substantially cylindrical vats, designated 1, 2, 3 and 4 respectively, but the number of vats employed may be increased or decreased without departing from our invention.

Satisfactory results can be obtained by the use of four extraction vats arranged at different levels and connected in successive order by pipes 15 having suitable valves 16 whereby communication between adjacent upper and lower vats can be effected at will in order to permit the discharge of the residual contents from one vat to another, as will presently be described.

Preferably the bottoms of the respective vats are conical in form and are provided with jackets 23 through which hot water (or steam) may be circulated for the purpose of efficiently heating the contents of the vats. These jackets are connected in successive order by means of pipes 24; the jacket of the lowermost vat having a suitable inlet pipe 25 through which the hot water (or steam) may be supplied to the jackets, and the jacket of the uppermost vat having a suitable outlet pipe 26 which, when hot water is employed as the heating agent, leads to and discharges into a suitably-elevated cistern 17.

The jacketed portions of the vats are provided interiorly with conical screens 16^a which are supported in spaced relation to the inner walls of such portions, respectively; said screens being truncated to provide discharge openings in direct communication with the valved openings of the respective vats, as indicated in Fig. 2. The vats are provided immediately above the discharge openings with lateral outlets from which extend suitable drain pipes 29, 30, 31 and 32 respectively, having appropriate regulating valves 33.

The batches of char within the vats are supported upon the bottom screens, and hence when the char is treated with extraction liquor as below explained the solutions of salts are strained from the char preparatory to their passage to the drain pipes. Each of the vats is provided with an appropriate rotary stirrer 16′ by means of which the more or less solid contents of the vat can be effectually agitated.

The cistern 17 which is adapted to con-

tain an adequate supply of hot water, is equipped with a coil 18 which is included in a circulating steam system. The steam supply pipe 19 with which the coil is connected is provided with a suitable valve 20 for regulating the supply of steam to the coil. Leading from the bottom of the cistern to the top of the third vat 3 is a supply pipe 21 having a suitable regulating valve 22, whereby predetermined quantities of hot water can be delivered to the vat 3.

Leading into the top of the lowermost vat is a cold water supply pipe 27 having a suitable valve 28.

1^a, 2^a, 3^a, and 4^a, designate four suitably-located storage tanks into which the solutions of salts are drained from the respective vats 1, 2, 3 and 4 through the pipes 29, 30, 31 and 32. Within each of the tanks is a heating coil 34 which is conveniently included in the circulating steam system, a suitable regulating valve 35 for the coil being provided.

Leading from the second and third tanks 2^a and 3^a to the top of the first vat 1, and leading from the fourth tank 4^a to the top of the second vat 2 are pipes 36, 37, 38 respectively, in operative connection with suitably-located pumps 39, 40, 41 respectively, by means of which pumps 39, 40 the contents of said second and third tanks may be pumped into the first vat 1, and by means of which pump 41 the contents of the fourth tank 4^a may be pumped into the second vat 2, as desired.

The operation is as follows: At the outset solutions of salts are extracted from succeeding batches of char in the respective vats and such solutions are supplied to the tanks; that is to say, char is delivered to the vats in successive order; hot water is supplied from the cistern to the third vat, and the gate, valves and pumps are properly operated until the respective solutions in the tanks 2^a, 3^a and 4^a are of sufficient strength to insure the efficient extraction treatment of each of a succession of batches of char, as follows:

The gate 14 is opened and a predetermined quantity of char is discharged from the bin into the first extractor vat 1, which vat has been previously filled with a volume of hot solution from the second tank 2^a equal to about three times the weight of the char.

The mixture of char and solution contained in the vat 1 is thoroughly agitated by actuating the rotary stirrer therein. The mixture is then allowed to settle within the vat, and the clear liquor is drained off as a saturated solution into the first tank 1^a by way of the pipe 29. The char remaining in the first vat is now mixed with hot solution from the third tank 3^a. The contents of the vat is agitated and then flushed therefrom into the second vat 2 through the opening of the valve 16 in the pipe connection between the two vats. The mixture in the second vat is then allowed to settle, and the liquor is drained through pipe 30 into the second tank 2^a, to serve as the agent for the first extraction treatment of the next following batch of fresh char delivered from the bin to the first vat. After draining, the char remaining in the second vat 2 is mixed with hot liquor pumped thereinto from the fourth tank 4^a. The mixture of char and liquor in the second vat is then agitated, and is flushed therefrom into the next lower or third vat 3 by manipulation of the valve 16 in the pipe connection at the bottom of the second vat. The mixture is then allowed to settle in the third vat, and the liquor is drained through the adjacent pipe 31 into the third tank 3^a for delivery to the first vat as above mentioned. The char remaining in the vat 3, is mixed with a volume of fresh hot water from the cistern 17, agitated and flushed through the opening of the valve 16 of the pipe connection at the bottom of said vat 3 into the lowermost vat 4. The mixture in the latter vat is allowed to settle therein, and the liquor is drained through pipe 32 into the tank 4^a for delivery to the second vat as above stated. At this stage, the char in the vat 4, being practically free from salts, is mixed with a volume of cold water supplied by the pipe 27, and the mixture is flushed through a valve 16^2 at the bottom of the vat 4 into a car 42 by means of which it may be transported to a remotely-located storage bin or other place of deposit.

The saturated solution of salts which is drained into the tank 1^a from the first extractor vat 1, is drawn, as need may require, from this tank into suitable evaporating pans for concentration.

We claim—

1. A leaching apparatus of the character described, comprising a series of vats, means whereby communication can be established between the vats in successive order, a series of tanks, means for draining liquid from the first vat of the series, drain connections between the succeeding vats and the tanks, means for supplying liquid to one of said succeeding vats, means whereby the liquid contents of certain of the tanks can be delivered to the first vat, and means whereby the liquid contents of the final tank can be delivered to one of said succeeding vats.

2. A leaching apparatus of the character described, comprising a series of vats, means whereby communication can be established between the vats in successive order, a series of tanks, means for heating the contents of said tanks, means for supplying liquid to the third vat of the series, drain connections from the vats to the respective tanks, means whereby the contents of the second and third

tanks can be delivered to the first vat, and means whereby the liquid contents of the final tank can be delivered to the second vat.

3. A leaching apparatus of the character described comprising a series of vats arranged in descending order, valve connections between the adjacent vats, a series of tanks, means for heating the contents of said tanks, means for supplying liquid to the third tank of the series, drain connections from the vats to the respective tanks, pump and pipe connections from the second and third tanks to the first vat, and pump and pipe connections from the final tank to the second vat.

4. A leaching apparatus of the character described comprising a series of vats on different levels having in their bottom portions main discharge openings and lateral drain outlets, valved connections between the discharge openings and the tops of adjacent tanks, strainers arranged within the bottom portions of the vats in spaced relation to the walls of such portions, said strainers covering the respective drain outlets and having discharge openings in communication with the discharge openings in the bottoms of the respective vats, and means for supplying extraction liquor to the said vats.

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