

H. D. MILES.
HEATING AND MIXING APPARATUS.
APPLICATION FILED JUNE 13, 1908.

1,039,779.

Patented Oct. 1, 1912.

2 SHEETS—SHEET 1.

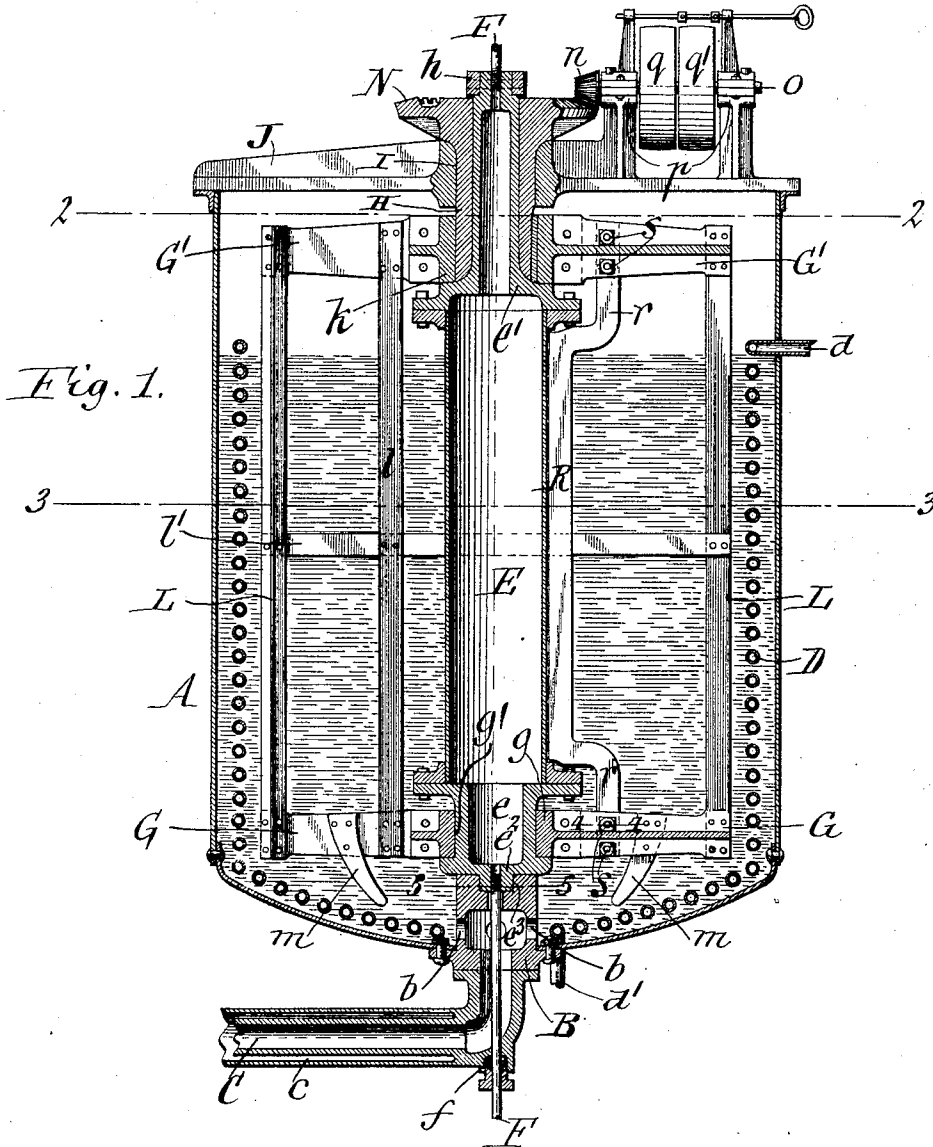
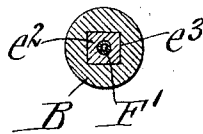


Fig. 5.

Witnesses:-
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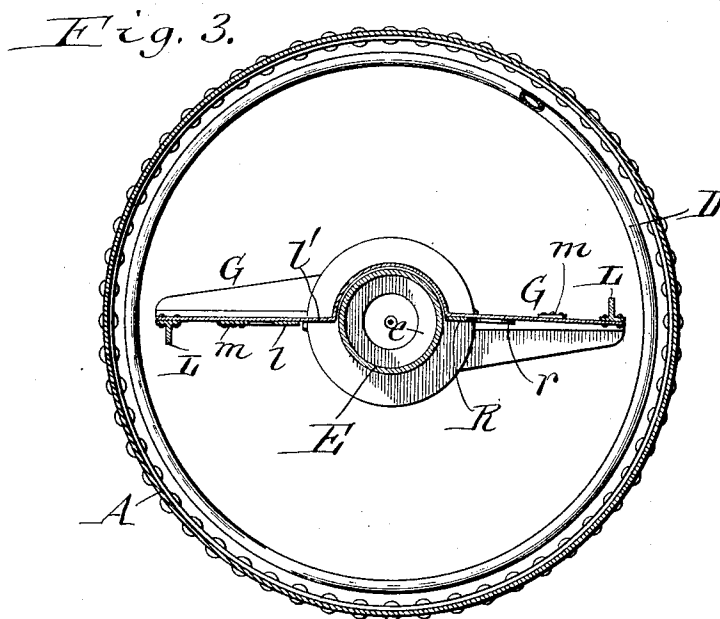
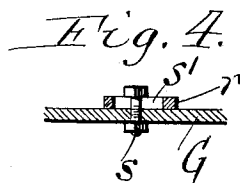
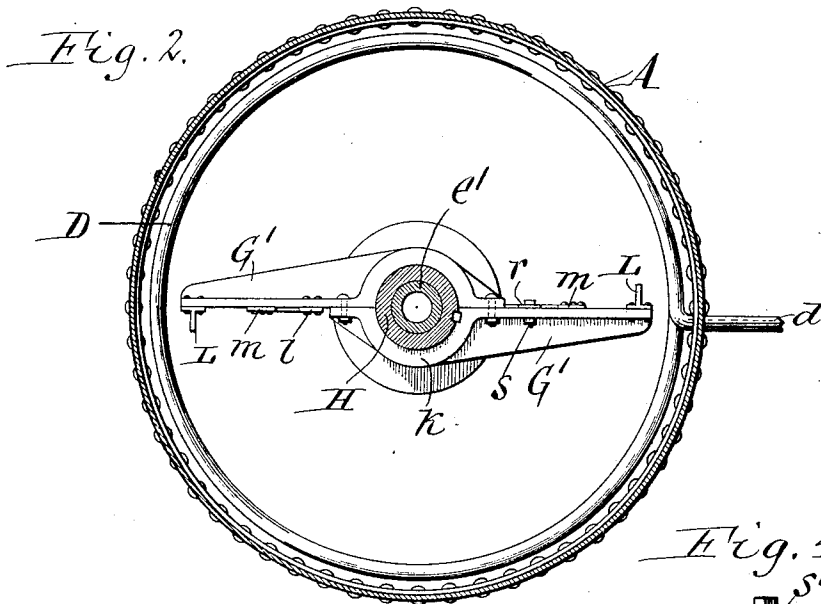
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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HEATING AND MIXING APPARATUS.

1,039,779.

Specification of Letters Patent.

Patented Oct. 1, 1912.

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To all whom it may concern:

Be it known that I, HENRY D. MILES, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Heating and Mixing Apparatus, of which the following is a specification.

This invention relates to a liquid heating and mixing apparatus which is more particularly designed for use in connection with a vacuum drying and impregnating apparatus whereby wood is impregnated with a preservative or electric coils are impregnated with an insulating material, but which may also be used for other purposes.

In some forms of heating and mixing apparatus as heretofore constructed a heating chamber rotates within the central part of the liquid tank for the purpose of maintaining the central part of the body of liquid at the proper temperature and consistency. This construction is objectionable because the material under treatment thickens on the exterior of this heating chamber and reduces its capacity of keeping the material at the required temperature, also because leakage is liable to occur at the joints between the heating chamber and the pipes, whereby the heating medium is fed to the heating chamber and the condensation is removed therefrom and for the further reason that such a construction is more complicated and expensive to maintain in proper working condition.

The object of this invention is to provide a liquid heating and mixing apparatus of this character in which the above mentioned objections are avoided.

In the accompanying drawings consisting of two sheets: Figure 1 is a vertical section of a liquid heating and mixing apparatus embodying my invention. Figs. 2 and 3 are horizontal sections in lines 2—2 and 3—3, Fig. 1, respectively. Fig. 4 is a fragmentary horizontal section, on an enlarged scale in line 4—4, Fig. 1. Fig. 5 is a fragmentary horizontal section in line 5—5, Fig. 1.

Similar letters of reference indicate corresponding parts throughout the several views.

A represents the tank reservoir, or holder which is adapted to contain the liquid to be heated and mixed. As shown in Fig. 1, this tank has an upright cylindrical body,

a downwardly dished bottom and is open at the top but if desired the same may be otherwise constructed. Various means may be provided for feeding the liquid to be heated and mixed into the tank and withdrawing the same therefrom, the means for this purpose shown in the drawings consisting of a hollow stool or pedestal B secured centrally to the bottom of the tank and provided in its sides with openings *b* whereby the interior of the stool is placed in communication with the interior of the tank, and a pipe or conduit C communicating with the lower end of the stool and surrounded by a jacket *c* through which steam or other heating agent may be circulated for preventing chilling of the liquid while passing through this conduit.

While the liquid is in the tank the same is maintained at the required temperature and consistency by means of an outer heater which operates upon the outer portion of the body of liquid and an inner heater which operates upon the inner or central part of the body of liquid and an agitator or stirrer is also provided which operates upon the liquid between the inner and outer heaters and thoroughly mixes the same so that the body of liquid is uniform throughout. The outer heater may be of any suitable construction, that shown in the drawings consisting of a coil D of pipe arranged adjacent to the inner side of the body and bottom of the tank and having an inlet *d* at its upper end for the admission of a heating agent or medium such as steam and an outlet *d*¹ at its lower end for the discharge of the water of condensation. The inner or central heater is stationary and preferably constructed in the form of a chamber having an upright cylindrical body E, a lower head *e* secured to the lower end of the body and removably supported on the stool B and an upper head *e*¹ secured to the upper end of the body and extending above the top of the tank. The heating medium such as steam is fed into the heating chamber through an inlet or supply pipe F connected with the upper end of its upper head and the water of condensation is discharged therefrom by an outlet pipe F¹ extending from the lower end of the lower head downwardly through the hollow stool and the adjacent part of the liquid conduit C, a

stuffing box f being provided between the latter and the outlet pipe for preventing leakage at the joint between the same. The central heating chamber is prevented from turning by a flat side boss e^2 on the underside of its lower head engaging with a correspondingly shaped socket e^2 in the top of the stool, as shown in Fig. 5.

Although the stirrer or agitator for mixing the liquid under treatment may be variously constructed that shown in the drawings is suitable for this purpose and consists essentially of a lower pair of diametrically opposite arms G, G constructed to form a hub g between them which turns on a bearing g^1 formed on the periphery of the lower head of the heating chamber, a driving sleeve or hollow shaft H journaled with its bore upon the periphery of the upper part of the upper head of the heating chamber while the central part of its periphery is journaled in a bearing I formed in a cross piece or bridge J arranged on the upper end of the tank, an upper pair of diametrically opposite arms G^1, G^1 constructed to form a hub k between them which is secured to the lower end of said sleeve, upright outer bars L, L connecting the outer ends of the pairs of arms, an intermediate bar l connecting the upper and lower arms on the same side of the heating drum, and paddles or wings m projecting from the lower arms downwardly toward the bottom of the tank. If desired the several vertical members of the agitator may be connected midway of their height by a cross bar l^1 . Each pair of agitator arms is preferably constructed in two parts, each of which consists of one arm and a semi-circular hub section, the hub sections of both arms being applied to opposite sides of the respective head of the heating chamber and connected together by bolts, as shown, or by other appropriate means. The means shown in the drawings for rotating this agitator consists of a bevel gear wheel N arranged at the upper end of the driving sleeve, a horizontal driving shaft O journaled in bearings p on the cross piece or bridge and provided with a bevel pinion n engaging with the gear wheel and tight and loose pulleys q, q^1 secured to the driving shaft and adapted to receive a driving belt. The driving sleeve is prevented from rising on the upper heating drum head by a collar h secured to said head above the driving sleeve.

In the absence of any provision to prevent it the material which is being heated and mixed will gradually thicken upon the periphery of the central heating chamber and reduce its heating effect. To avoid this a scraping device is provided which moves around the body of the heating chamber and either in contact with its periphery or close thereto so that it operates to remove

the material from the periphery of the heating drum, whereby accumulation or thickening of the material thereon is prevented and the same is maintained in the highest state of efficiency for heating the liquid uniformly. The scraping device for this purpose shown in the drawings consists of an upright blade R arranged lengthwise of the periphery of the body of the heating chamber and provided at its upper and lower ends with outwardly offset arms r, r which are adjustably secured to the adjacent arms of the agitator by means of bolts s, s arranged on said agitator arms and passing through radial slots s^1 of the scraper arms. By adjustably connecting the scraper with the agitator it is possible to bring the scraper into the proper position relatively to the heating chamber to suit the consistency of the material under treatment or other conditions and it also renders it possible to take up any wear which may occur between the cooperating surfaces of the scraper and the heating drum.

Inasmuch as the inner heating chamber is stationary no difficulties are encountered in keeping tight the joints between the same and the steam inlet and condensation outlet pipe; it also reduces the amount of power required to operate the apparatus inasmuch as there are fewer parts to rotate, and it also enables the outer side of the heating chamber to be kept clear of accumulations thereby increasing the efficiency of the apparatus and decreasing the cost of maintenance.

When installed the lower end of the tank A is connected by the pipe C with the lower end of an impregnating tank which has a removable cover at its top to permit of introducing and removing the articles to be impregnated from said last mentioned tank and which is connected with means whereby the air may be exhausted from said impregnating tank or compressed air may be delivered into said impregnating tank, the pipe C being provided with a valve to permit of establishing or interrupting communication between said tanks. In using this apparatus said valve is closed, a batch of impregnating mixture is heated and mixed in the tank, a charge of articles to be impregnated, such as blocks of wood or electric coils are placed in the impregnating tank and the latter is closed tight. After the air has been exhausted from the impregnating tank to an extent to produce the desired vacuum, the valve in the pipe C is opened, thereby causing the liquid to be sucked from the mixing and heating tank into the impregnating tank and submerge the articles in the latter. After the liquid has been thus transferred into the impregnating tank, the valve in the pipe C is closed, the exhaust device is cut off from the impregnating tank and compressed air is admitted to the same, thereby causing

the impregnating fluid to be forced into the pores or crevices of the articles under treatment. After this pressure has been maintained a sufficient length of time to insure impregnation, the valve in the pipe C is opened, whereby the compressed air in the impregnating tank causes the liquid in the latter to be expelled therefrom into the heating and mixing tank A, after which the valve in the pipe C is closed and the impregnating tank opened for removing the treated articles therein and replacing the same by untreated articles preparatory to beginning another cycle of operations.

I claim as my invention:

1. A liquid heater and mixer comprising a liquid holder or tank, a stationary heating chamber arranged centrally in the tank and adapted to contain a heating medium, an agitator arranged in the tank and rotatable around said heating chamber, and a scraper engaging with said heating chamber, substantially as set forth.

2. A liquid heater and mixer comprising a liquid holder or tank, a stationary cylindrical heating chamber arranged centrally in the tank and adapted to contain a heating medium, a movable agitator arranged in the tank, and a scraper mounted on the agitator and engaging with the periphery of said heating chamber, substantially as set forth.

3. A liquid heater and mixer comprising an upright tank, an upright stationary cylindrical heating chamber arranged centrally in the tank and supported at its lower end on the bottom of the same, a scraper engaging said chamber, and an agitator arranged in the tank and connected with the scraper, substantially as set forth.

4. A liquid heater and mixer comprising an upright tank, an upright stationary cylindrical heating chamber arranged centrally in the tank and supported at its lower end on the bottom of the same, and an agitator arranged between the bore of the tank and the periphery of the heating chamber and rotatably supported on said heating chamber, substantially as set forth.

5. A liquid heater and mixer comprising an upright tank, an upright cylindrical heating chamber arranged centrally in the tank and supported at its lower end on the bottom of the same, an agitator arranged in the tank and rotatably supported on said heating chamber, and a scraper mounted on the agitator and engaging the periphery of the heating chamber, substantially as set forth.

6. A liquid heater and mixer comprising an upright tank, an upright stationary cylindrical heating chamber arranged centrally in the tank and supported at its lower end on the bottom of the same, an agitator arranged between the bore of the tank and the periphery of the heating chamber and ro-

tatably supported on said heating chamber, and means for rotating said agitator connected with the upper part of the same, substantially as set forth.

7. A liquid heater and mixer comprising an upright tank, an upright cylindrical heating chamber arranged centrally in the tank and supported at its lower end on the bottom of the same, an agitator arranged in the tank and rotatably supported on said heating chamber, a scraper mounted on the agitator and engaging the periphery of the heating chamber and driving means connected with the upper part of the agitator, substantially as set forth.

8. A liquid heater and mixer comprising an upright tank, an upright cylindrical heating chamber arranged centrally in the tank and supported at its lower end on the bottom of the same, an agitator arranged in the tank, and a scraper engaging said heating chamber and adjustably connected with the agitator, substantially as set forth.

9. A liquid heater and mixer comprising an upright tank, a stool secured to the bottom of the tank and having a passage through which the material to be heated and mixed is fed into the tank and withdrawn therefrom, an upright heating chamber arranged centrally within the tank and having a cylindrical body, a lower head resting on said stool and an upper head, a rotatable agitator having upper and lower arms journaled on said upper and lower heads and bars connecting said arms, and a driving sleeve surrounding said upper head and connected with the upper arms of the agitator, substantially as set forth.

10. A liquid heater and mixer comprising an upright tank, a stool secured to the bottom of the tank and having a passage through which the material to be heated and mixed is fed into the tank and withdrawn therefrom, an upright heating chamber arranged centrally within the tank and having a cylindrical body, a lower head resting on said stool and an upper head, a rotatable agitator having upper and lower arms journaled on said upper and lower heads and bars connecting said arms, and a scraper engaging with the periphery of the body of the heating chamber and connected at its upper and lower ends with the upper and lower arms of the agitator, substantially as set forth.

11. A liquid heater and mixer comprising a tank, a stool secured to the bottom of said tank and having a flat sided socket, and a heating chamber having a flat sided boss engaging with said socket, substantially as set forth.

12. A liquid heater and mixer comprising a tank, a stool secured to the bottom of said tank and having a flat sided socket, a heating chamber having a flat sided boss engag-

ing with said socket, an agitator rotatable
on said chamber and having a driving sleeve
at its upper end, a bridge arranged on the
tank and having a bearing in which said
5 sleeve is journaled, and a collar arranged
on the heating chamber above the driving
sleeve, substantially as set forth.

Witness my hand this 11th day of June,
1908.

HENRY D. MILES.

Witnesses:

THEO. L. POPP,
E. M. GRAHAM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."