No. 611,164. Patented Sept. 20, 1898.

M. ZAHN.

PROCESS OF OBTAINING LIME SUCRATE.

(Application filed Sept. 5, 1896.)

(No Model.)

G-C-D-H

Fig. 3,

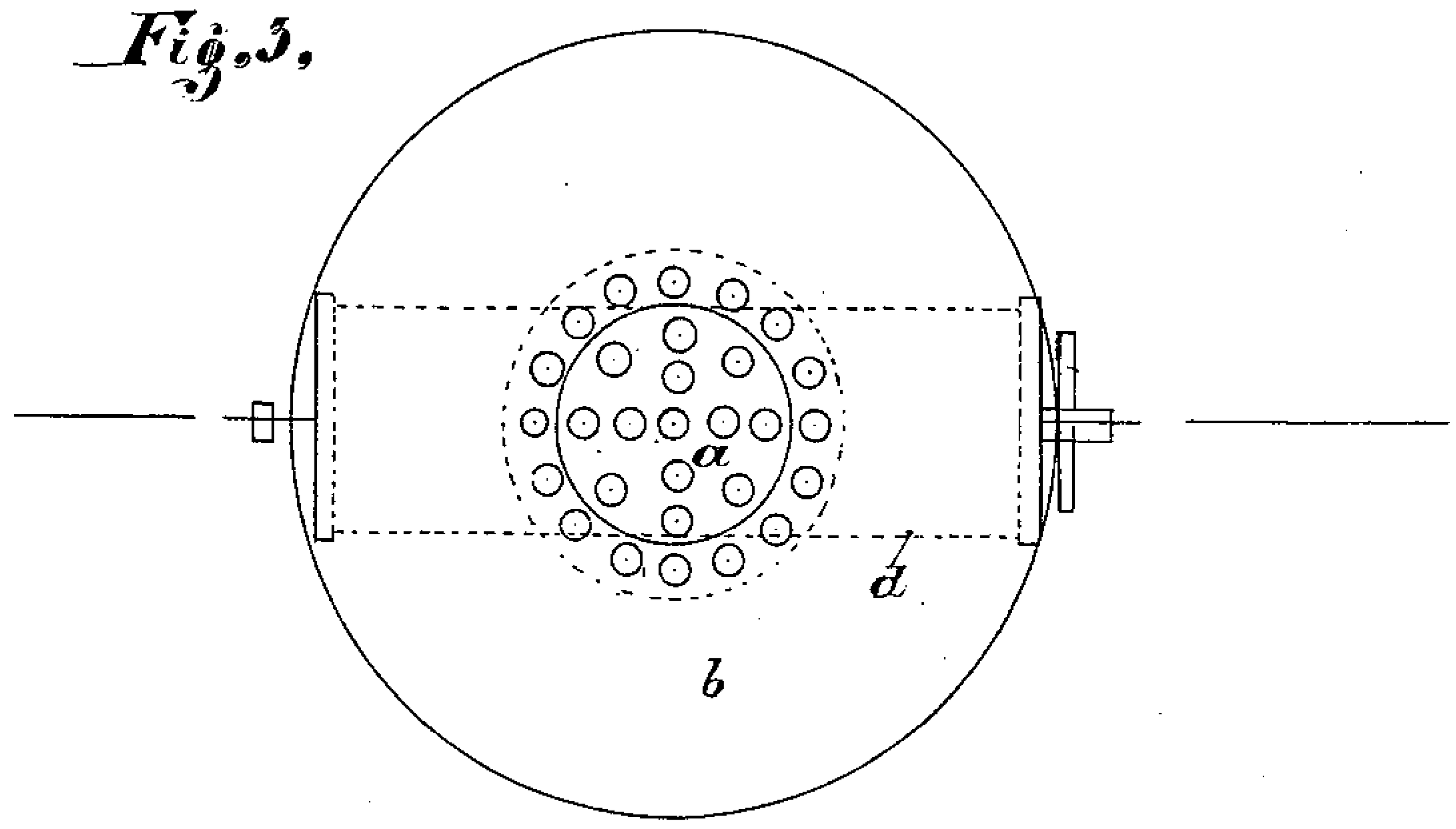


Fig. 1,

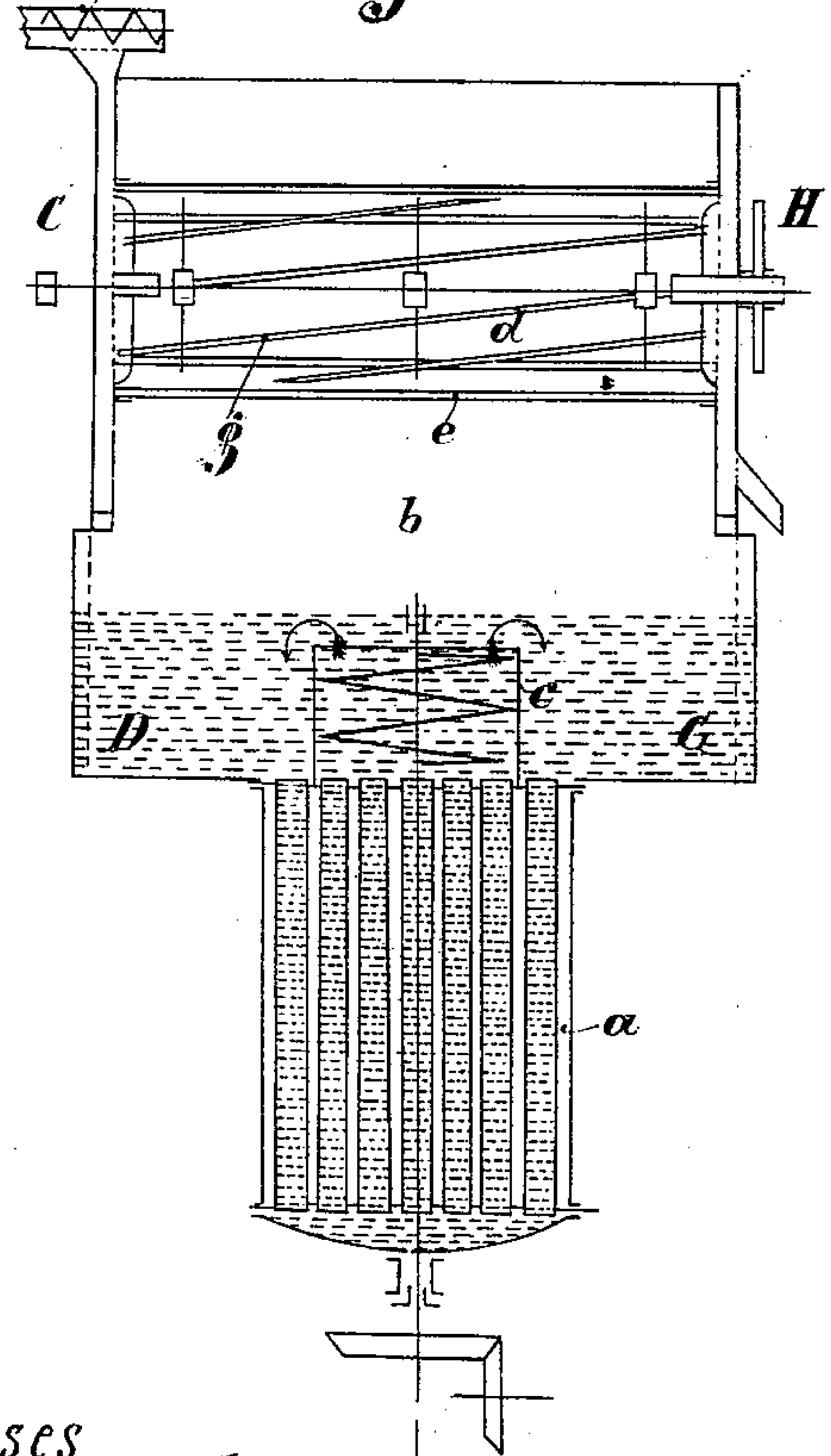
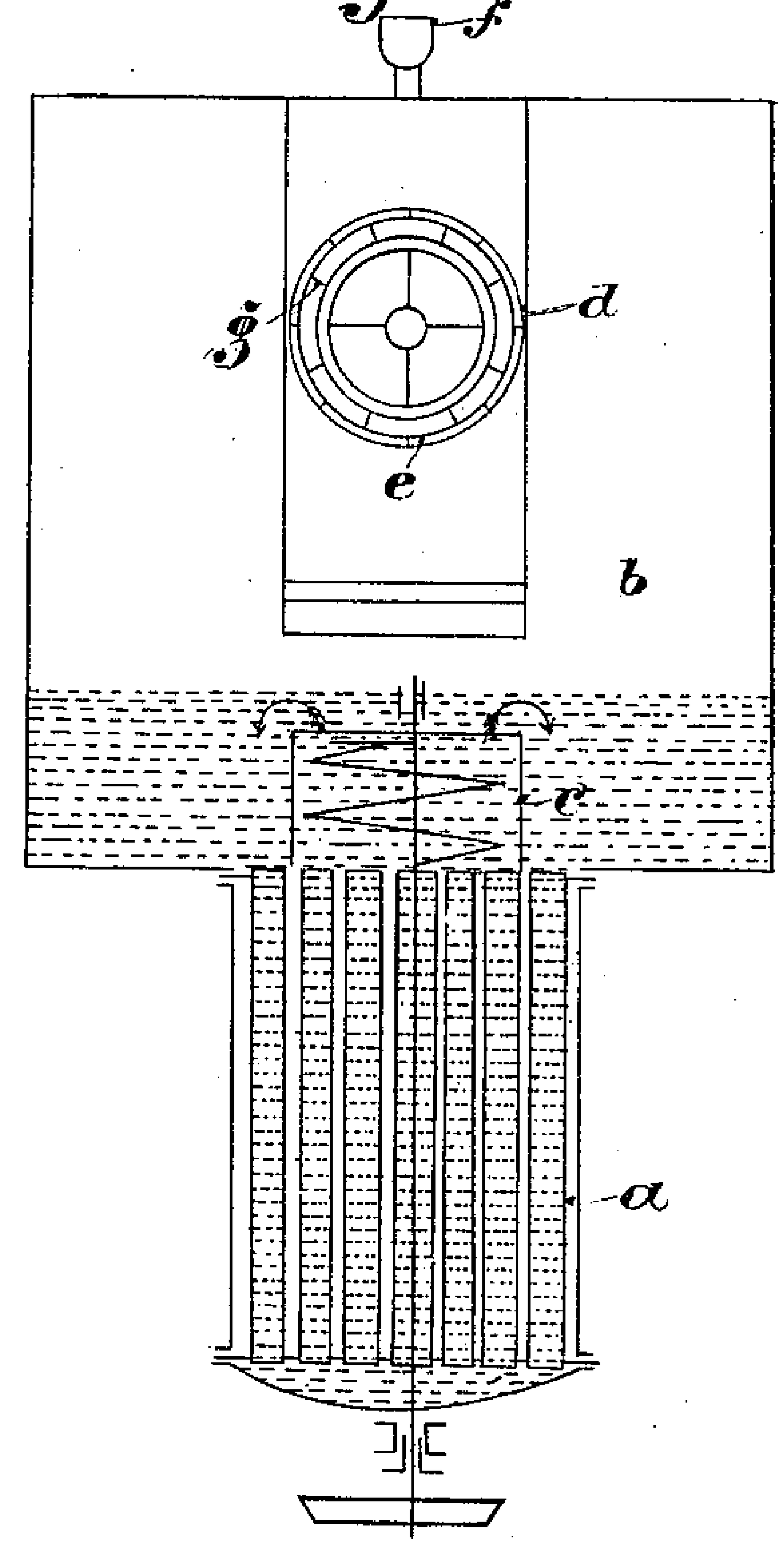


Fig. 2,



Witnesses_
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UNITED STATES PATENT OFFICE.

MAX ZAHN, OF ARTERN, GERMANY.

PROCESS OF OBTAINING LIME SUCRATE.

SPECIFICATION forming part of Letters Patent No. 611,164, dated September 20, 1898.

Application filed September 5, 1896. Serial No. 605,027. (No specimens.)

To all whom it may concern:

Be it known that I, MAX ZAHN, a subject of the King of Prussia, residing at Artern, in the Kingdom of Prussia and German Empire, have invented new and useful Improvements in the Production of Sugar from Molasses, of which the following is a specification.

My invention relates to a process for the production of sugar from molasses, which consists in separating the sugar in the form of a nearly insoluble lime compound from molasses or a sugar solution saturated with lime by introducing into the solution less than thirty parts of calcium oxid to one hundred parts of the sugar in the solution, the calcium oxid being sifted into the sugar solution in the form of a diffused cloud of fine lime-dust, evenly distributed over the whole surface of said solution and rapidly and thoroughly incorporated therewith through a positive stirring movement imparted to the solution in such manner as to avoid foaming and a consequent formation of lime hydrate, that seriously would interfere with a complete and economical production of lime sucrate. By these means the process constitutes an important improvement in the method of separating sugar from a solution of molasses by means of calcium oxid.

As is well known, the separation of sugar from basic solutions by means of powdered lime is no longer novel; but those known methods are of the kind in which, for the purpose of precipitating the sugar from the solution of molasses after this solution has been saturated with lime, more than thirty parts, by weight, of calcium oxid to one hundred parts of sugar must be added in order to separate the sugar in the form of sucrate. Since the sugar is present in the form of a double basic sucrate in the solution of molasses saturated with lime according to methods heretofore known, theoretically there would still be one molecule of calcium oxid to one molecule of sugar necessary—that is to say, about sixteen parts, by weight, of calcium oxid to one hundred parts, by weight, of sugar—so that even with the lowest number of thirty parts, by weight, of calcium oxid used there is about one molecule of calcium oxid in excess; but in practical working hitherto the quantity of thirty parts, by weight, of calcium oxid has had to be greatly exceeded for the purpose of effecting a sufficient precipitation of sugar. In practice at least one hundred and twenty parts, by weight, of calcium oxid to one hundred parts, by weight, of sugar were necessary. This is equivalent to seven molecules of calcium oxid to one molecule of sugar instead of the three molecules which are theoretically necessary; but when the calcium oxid (lime-dust) used for precipitating the sugar is introduced in the form of a fine cloud into the solution the use of three to three and one-half molecules of calcium oxid to one molecule of sugar is as effectual in precipitating all the sugar from a solution of molasses as is the use of seven molecules of calcium oxid by other methods—that is to say, this precipitation can be effected with considerably less than thirty parts, by weight, of calcium oxid to one hundred parts of sugar from a solution saturated with lime. This method of precipitating produces the following advantages: First, a great saving in lime-flour is effected. Then the same plant is rendered considerably more efficient; also, the quantity of lime in excess, which becomes subsequently very inconvenient, is entirely avoided and thus acts indirectly to increase the efficiency. Further, by using this improved process a great saving in cooling-water is effected, the precipitating operation takes less time, and thus the efficiency of the same plant is considerably increased, because, as is well known, the quantity of lime hitherto added in excess had to be slaked, which is just what is not wanted, while the heat produced by the slaking operation either affected the precipitation injuriously or such heat had to be neutralized by cooling; but when only three to three and one-half molecules of calcium oxid are employed and added in the form of a dust-cloud almost no heating takes place.

My process is carried out by arranging a rotary distributing and sifting apparatus—such, for example, as the revolving sifters usually employed for separating the lime-dust from large lumps—directly over a vessel which is provided with a stirring device and which contains the molasses or syrup solution. The lime-dust flying out of the rotary sifting-machine settles in the form of a dif-

fused fine dust or cloud upon the whole surface of the liquid and by the further action of the positive stirring device is thus rapidly and thoroughly incorporated with the liquid in a state of extreme fineness.

The accompanying drawings illustrate an arrangement of apparatus suitable for use on a commercial scale for incorporating the lime-flour in a state of fine dust with the molasses.

Figure 1 is a vertical section of a machine or apparatus suitable for carrying out my process. Fig. 2 is a similar view taken at a right angle to Fig. 1. Fig. 3 is a top plan view.

The lower portion *a* of the apparatus is made in the form of a cooling device, with which is connected at the top a wide vessel *b*, containing a stirring-worm *c*. Upon this vessel is mounted a rotary distributer *d*, inclosed in a meshed rotary casing *e*. The lime-flour, which is introduced into this sifting and distributing device by means of the worm conveyer *f*, is driven by the beaters *g* of the distributing device through the fine gauze of the outer casing *e*. The whole space around the sifting-machine is filled with a diffused cloud of lime-dust thrown off centrifugally, and this lime-dust settles in a state of fine subdivision evenly upon the whole surface of the sugar solution, where it is then rapidly and thoroughly incorporated with the said solution through the positive movement of the same produced by the stirring-worm. This manner of distributing lime-powder in such a state of fineness that it will slowly settle down and evenly fall upon the whole surface of the slightly-agitated sugar solution in form of a dust-cloud has the great advantage over all processes known in the art of desucrating sugar-containing solutions that every individual particle of oxid of lime coming in contact with said sugar solution readily forms the desired sucrate of lime without forming hydrate of lime, as is done invariably whenever conglomerations of finely-powdered oxid of lime come in contact with watery sugar solution. Any formation of hydrate of lime is accompanied by a great rise of temperature, as is well known. This rise of temperature not only requires an increase in the quantity of the cooling medium to a great extent, but also in the quantity of lime and besides deteriorates the quality of the sucrate obtained. Furthermore, the uniform and positive stirring in the manner described entirely avoids the formation of foam, that is detrimental to the sought desucration, as is well known in the art, as every particle of lime coming in contact with said foam is lost for the sought reaction—namely, formation of lime sucrate.

What I claim as my invention is—

The herein-described process for obtaining lime sucrate from aqueous solutions of molasses, at ordinary temperature, which consists in sifting uniformly upon the whole surface of said aqueous solution less than thirty parts of finely-divided caustic lime-dust to each one hundred parts of sugar in the solution, the said lime-dust being caused to settle in the form of a diffused cloud over the whole of the solution, and positively stirring the solution during the operation of evenly distributing the fine lime-dust on the surface of said solution, whereby every particle of fine lime-dust is rapidly incorporated in the solution of molasses in such manner as to prevent foaming and formation of lime hydrate, the sucrate of lime being produced with a large percentage of saving in the use of lime, substantially as specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

MAX ZAHN.

Witnesses:
W. HAUPT,
HENRY HASPER.