E. E. HORSTMANN.

CONCENTRATOR.

APPLICATION FILED AUG. 20, 1917.

1,335,504.

Patented Mar. 30, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

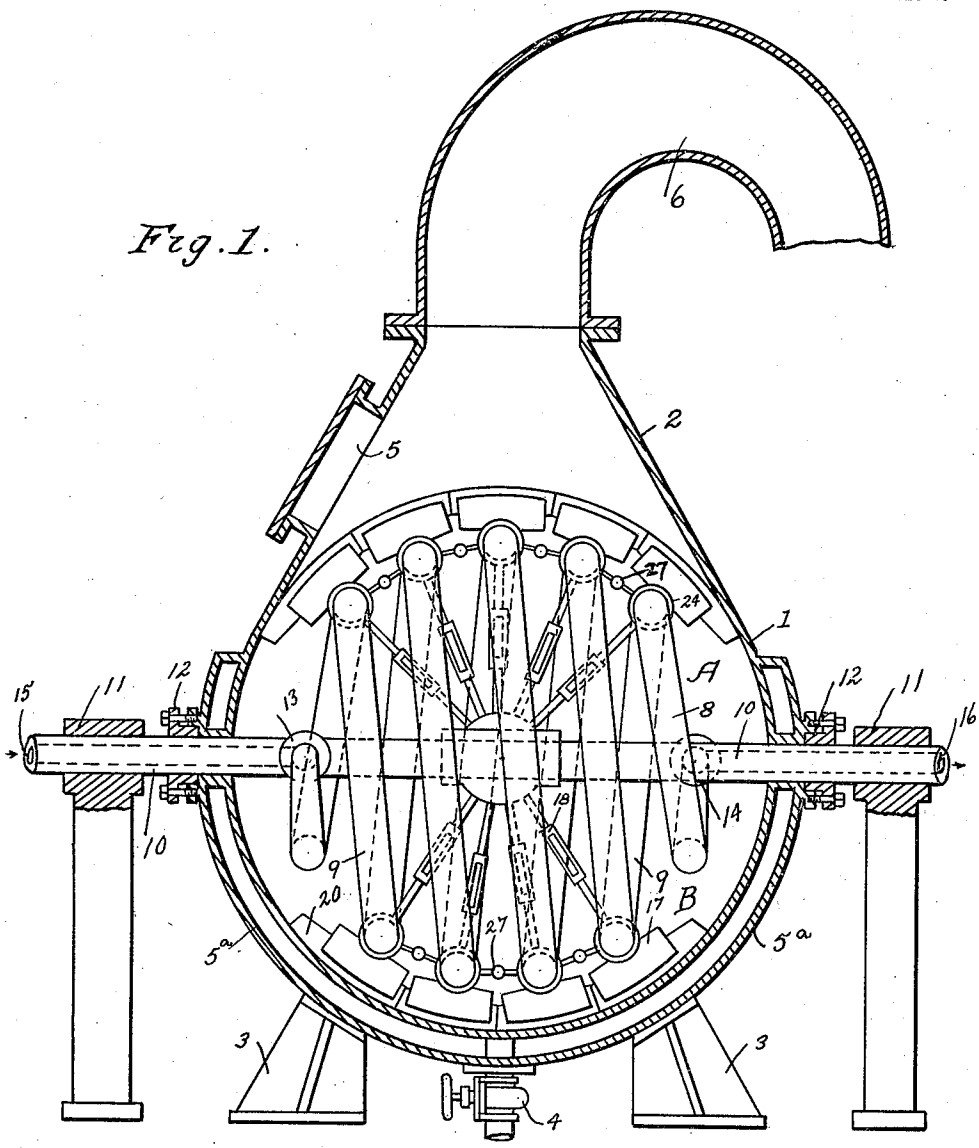
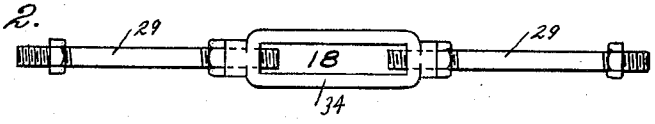


Fig. 2.



Witnesses,
Chas. J. Chunn
H. Gearing.

Inventor;
Ernst E. Horstmann,
By Raymond Jones Hayden,
His Attorney.

E. E. HORSTMANN.

CONCENTRATOR.

APPLICATION FILED AUG. 20, 1917.

1,335,504. **Patented Mar. 30, 1920.**

2 SHEETS—SHEET 2.

Fig. 3.

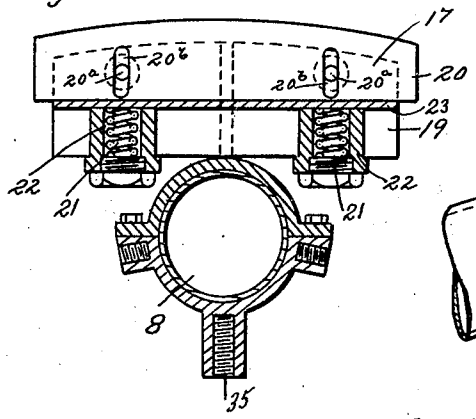


Fig. 4.

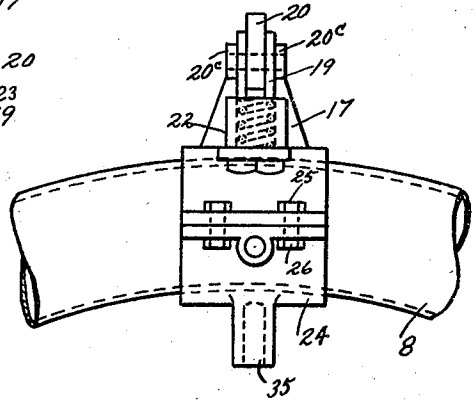


Fig. 5.

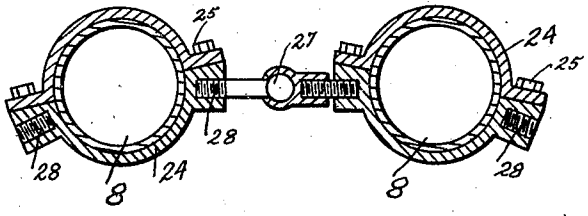


Fig. 6.

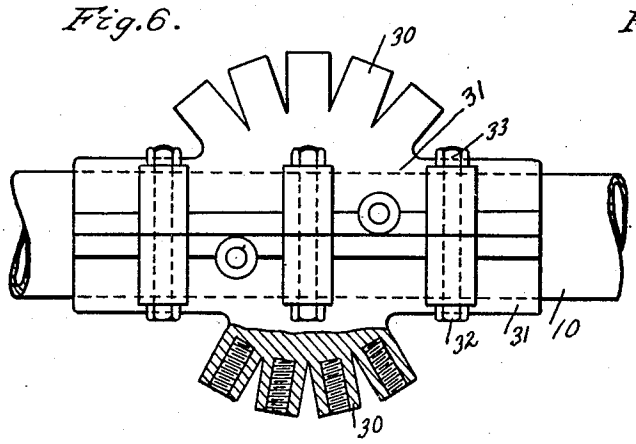
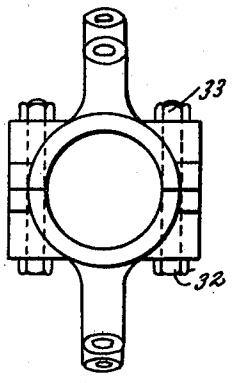


Fig. 7.



Witnesses,
Chas. J. Thum
H. Gering

Inventor,
Ernst E. Horstmann,
By Raymond Jacobs Vickers,
His Attorney.

UNITED STATES PATENT OFFICE.

ERNST E. HORSTMANN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO FRANK A. McALLISTER, OF LOS ANGELES, CALIFORNIA.

CONCENTRATOR.

1,335,504. Specification of Letters Patent. Patented Mar. 30, 1920.

Application filed August 20, 1917. Serial No. 187,174.

To all whom it may concern:

Be it known that I, ERNST E. HORSTMANN, a subject of the Emperor of Germany, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Concentrators, of which the following is a specification.

This invention relates to improvements in concentrators such as are used in treating food or other materials.

The invention consists primarily in the provision of a concentrator which is simple in construction, inexpensive, compact and effective in operation.

One of the objects of the invention is to provide for an expeditious and thorough cooking or trying out action, the particular association of the cooking element relative to the working chamber and the construction of said element providing for the advantageous cooking action above noted.

Another object is to provide a novel means for maintaining the inner surface of the working chamber, clean and free from accumulations or deposits.

The invention further consists in the particular combination, inter-relation and association of the parts thereof such as illustrated in the following description and accompanying drawings.

Other objects and advantages will appear during the course of the following description:

Figure 1 is a vertical sectional view of a concentrator embodying the invention;

Fig. 2 is a detail side elevation of one of the adjusting members for the scraping means;

Fig. 3 is an enlarged detail sectional view of one of the scraping members;

Fig. 4 is an end elevation of the scraping member shown in Fig. 3;

Fig. 5 is a detail cross sectional view showing the manner of connecting the several means for supporting the scraping members;

Fig. 6 is a detail front elevation of a hub device shown in Fig. 1; and,

Fig. 7 is an end elevation of the hub shown in Fig. 6.

Referring to the drawings, by reference characters:

1 designates the working chamber of the concentrator. This chamber may be constructed as desired and as shown is in the form of a hollow sphere having an elongated open neck portion 2 on its upper side. The chamber may be supported upon standards as at 3 and is provided with a valved outlet or drain 4 upon its lower side. An intake opening 5 is formed in the side of the chamber near the upper end thereof and provides for the introduction of material to be treated. An exterior steam jacket 5ª is applied to the chamber 1.

A curved or suitably arched flue or neck 6 is secured to the neck 2 and provides for the discharge of the vapors and gases arising, during the cooking or trying-out action.

As a means for heating or concentrating there is provided a heating or cooking element A which is disposed within the working chamber. Preferably this element is rotatable and it may be constructed in various ways not shown, providing, however, a degree of heat suitable for concentration is obtained.

In the present embodiment of the invention the element A comprises an approximately spherical pipe coil 8 in which the convolutions or coils 9 are preferably equidistantly spaced from the inside walls of the chamber.

There is provided a means to support and to conduct the heating or cooking fluid to the coil 8 which also preferably provides for the rotation and support of the coil. As shown this means comprises a preferably horizontal shaft 10 that is extended into and through the chamber 1 at the widest part of said chamber. This shaft 10 is journaled in upright bearings 11 which are mounted upon opposite sides of the chamber 1 and stuffing boxes 12 are provided on opposite sides of the chamber to prevent leakage at the points where the shaft is extended into the chamber. The ends of the coil are suitably fastened to the shaft 10 as at 13 and 14. There is provided a feed passage 15 in the shaft which communicates with a steam or other heated fluid supply source not shown and with one end of the coil 8 at the point 13. An exhaust or condensate passage 16 is formed in the shaft 10 and communicates with the other end of the coil at the point 14 and with the atmosphere at the adjacent end of

the shaft. Any suitable means not shown may be provided to rotate the shaft 10, such as a pulley and belt.

Means B are provided to prevent scale and matter treated in the chamber from forming upon or adhering to the inside wall of the chamber during the operation thereof. The intense application of heat by the steam jacket 5^a tends to cook the contents of the chamber within the zones of such steam jacket, and particularly in the lower region of the chamber 1, and the means B serve effectively to rid the inner surface of the chamber 1 of any adhesion due to such cooking. Left to accumulate such adhesions would interfere with the transmission of heat from the jacket 5^a and likewise lower the quality of the concentrated product, as well as oppose the free rotation of the coils 9. This means is rotated within the chamber in contact with those portions of the walls of chamber which come into contact with the material being worked or concentrated and keep said portions clean by a scraping action. The means above mentioned consist of scraping elements 17 which are preferably carried by the coil 8. These elements are adjustable through the instrumentality of adjusting means 18 so as to regulate the scraping action to make said action more or less severe as desired, and to modify the action of the springs 21 hereinafter described. The adjusting means 18 likewise serve as radial connection means for the coils 9.

The elements 17 comprise holders 19 in which are mounted scraper blades 20. These blades may be constructed of wood or other suitable material and are arranged to engage the inner surface of the chamber during the rotation of the cooking element A. Bolts 20^a pass through the holder 19 and through enlarged slots 20^b in the blades 20, said bolts being held in place by the nuts 20^c. Expansion springs 21 which are mounted in pockets 22 therefor carried by the holders 19, serve to force the blades into operative contact with the chamber 1. Plates or strips 23 are placed within the holders in engagement with the springs and the blades rest on these plates.

As a means for securing the holders 19 to the convolutions or coils 9 of the cooking element A there are preferably provided split rings or clamps 24 which are held upon the coils 9 by bolts 25 secured in place by nuts 26. The holders 19 are rigidly connected with the clamps 24. Preferably the scraping elements 17, that is, the clamps 24 thereof, are secured to one another by knuckle or ball joints 27 as shown in detail in Fig. 5 of the drawings. There are provided screw threaded sockets 28 on the clamps 24 to receive the threaded ends of the knuckle joints 27. These joints 27 or connections between the elements 17 suitably reinforce the entire structure and add rigidity to the coil 8 and its coöperating parts, thereby stiffening the structure appreciably.

The adjusting means 18 for the scraper elements 17 comprises sectional rods 29, the inner ends of which are threaded into the radially projecting sockets 30 of a hub member 31 fixed to the shaft 10. The hub 31 is preferably split and is held upon the shaft 10 by bolts and nuts 32 and 33, respectively. The sectional rods 29 are joined by turnbuckles 34 and the outer ends of the rods are turned into sockets 35 which are carried upon the under side of the clamps 24. By properly manipulating the turnbuckles 34 the degree of contact of the blades 20 with the working chamber may be varied as desired. To do this the coils 9 must be slightly expanded.

Assuming that the cooking element is rotating and steam is flowing through the pipes 9, when material to be worked is introduced through the opening 5 it is immediately agitated and heated upon coming in contact with the coils 9 of the cooking element A. The material is thoroughly stirred or worked by the rotating coil and a thorough and expeditious cooking and concentrating of the material is thus provided. While the coil 8 is rotating the scraping blades scrape and keep the portions of the surface contacted from time to time by the cooking material, free from accumulations and adhesions of material being treated, and likewise agitate and stir the material in conjunction with the coils 9.

The cooking and concentrating action is carried on as desired and the concentrated matter, such as soup stock and food paste, may be drained through the outlet 4 and collected as desired. The vapors and gases arising from the chamber pass upwardly through the neck 2 into the flue 6. These vapors or gases may be discharged into the atmosphere or collected and condensed if desired.

When it is desired to regulate the scraping action the adjusting means 18 comprising the rods 29 and means 34 is operated. This is done by manipulating the turnbuckles 34 and causing the rods to be lengthened or shortened as the case may be. When the rods are lengthened the coils 9 are expanded slightly and as these coils carry the scraping members, the scraper blades 20 will be forced into definite contact with the chamber 1. The shortening of the rods 29 lessens the degree of contact of the scraping blades 20. The provision of these rods and the connections 27 between the clamps 24 add rigidity to structure and increase the area thereof so as to cause a thorough agitation of the material being

worked. The adjusting means 18 and scraping means B likewise effectively agitate the contents of the chamber 1, in a general path transverse to the screw feed of the coils 9. While the adjusting means are important in their function of permitting adjustment as described, an equally important function of such means is to serve as radial connections between the coils 9 and the shaft 10, transferring to the shaft, from a plurality of points on the coils the stresses, incident to proper bracing of the coils and opposing resistance of the mass of inert material in the chamber. This opposition of the mass is the greater in the lower portion of the chamber 1, inasmuch as ebullition takes place in the upper portion of the chamber. These stresses, in other words, are not borne alone and ineffectively by the ends of the coils at the points 13 and 14, but are borne by the shaft at a common center by the positive radial bracing of the separate means 18. This action likewise, in maintaining the inherent rigidity of the coils 9, furthermore conserves the proper disposition of the scraper blades 20, which action is supplemented by the action of the joints or connections 27. The radial disposition of the connecting or adjusting means 18 permits of use of interchangeable turnbuckles 34 and rods 29 of the same length.

With reference to the foregoing description and accompanying drawings it will be seen that there is provided a concentrator which is so constructed and arranged that it may be operated at low cost and with maximum efficiency to treat food and other materials. One of the essential features of the invention is the provision of an internally disposed cooking or concentrating member, and the rotation of said member and its associated parts to keep the working chamber free from accumulations. This disposition of the cooking element results in economy, expeditiousness and thoroughness of operation of the concentrator.

While I have illustrated and described the preferred embodiment of the invention, it is to be understood that minor changes in details of construction and in the size and proportion of the parts may be resorted to when required without departing from the spirit and scope of the invention.

I claim:

1. A concentrator including a working chamber, a shaft extending through the working chamber, an agitator mounted upon the shaft and formed of convolutions of tubular pipe, radial braces connecting the convolutions of pipe to the shaft, means for adjusting the braces to lengthen or shorten the same, and scrapers carried by the convolutions of pipe and arranged to act upon the walls of the chamber as the agitator is rotated.

2. A concentrator including a working chamber, a shaft extending transversely through the same, a rotary agitator carried by the shaft and formed of convolutions of tubular pipe, transverse braces connecting adjacent convolutions of pipe, radial braces connecting the pipe convolutions to the shaft and adjustable to vary the length thereof, and scrapers carried by the pipe convolutions for acting upon the walls of the chamber as the agitator is rotated.

3. A concentrator including a working chamber, a shaft extending through the working chamber, a rotary agitator mounted upon the shaft and formed of convolutions of steam pipe, means for circulating a heating medium through the convolutions of pipe, transverse braces connecting adjacent convolutions of pipe, radial braces connecting the various pipe convolutions to the shaft, and means for adjusting the radial braces to lengthen or shorten the same.

4. A concentrator including a working chamber, a shaft extending through the working chamber, a hub member fitted upon the shaft, a rotary agitator carried by the shaft and formed of convolutions of steam pipe, means for circulating a heating medium through the convolutions of steam pipe, collars fitted upon adjacent convolutions, transverse braces connecting the collars of adjacent convolutions, and radial braces connecting the said collars to the before mentioned hub, said radial braces being adjustable to vary the length thereof.

5. A concentrator including a working chamber, a shaft extending through the working chamber, a rotary agitator mounted upon the shaft and formed with a plurality of convolutions of steam pipe, means for circulating a heating medium through the convolutions of pipe, collars fitted upon adjacent convolutions, a system of braces connecting the collars, a guide carried by each collar, a yieldably mounted scraper carried by each guide and arranged to engage the walls of the working chamber as the agitator is rotated.

6. A concentrator including a working chamber, a shaft extending through the working chamber, a rotary agitator mounted upon the shaft and formed of a series of convolutions of tubular pipe, means for circulating a heating medium through the pipe, collars fitted upon adjacent convolutions of pipe, a scraper carried by each collar and arranged to engage the walls of the working chamber as the agitator is rotated, transverse braces between the collars of adjacent convolutions, and radial braces between the collars and the shaft, said radial braces being adjustable longitudinally.

7. A concentrator including a substantially spherical working chamber, a shaft

extending transversely through the same, a substantially spherical skeleton agitator mounted upon the shaft and formed of convolutions of tubular pipe, means for circulating a heating medium through the pipe, collars fitted upon adjacent convolutions of the agitator, a guide upon each collar, yieldably mounted scrapers slidably carried by the guides and arranged to engage the walls of the chamber as the agitator is rotated, transverse braces connecting adjacent collars, a hub member fitted upon the shaft, and radial braces connecting the hub member to the collars, said radial braces being extensible.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

ERNST E. HORSTMANN.

Witnesses:

RAYMOND I. BLAKESLEE,

J. SHUTT.