

No. 816,055.

PATENTED MAR. 27, 1906

T. J. ZOELLER.  
CENTRIFUGAL MELTING DEVICE.

APPLICATION FILED OCT. 11, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

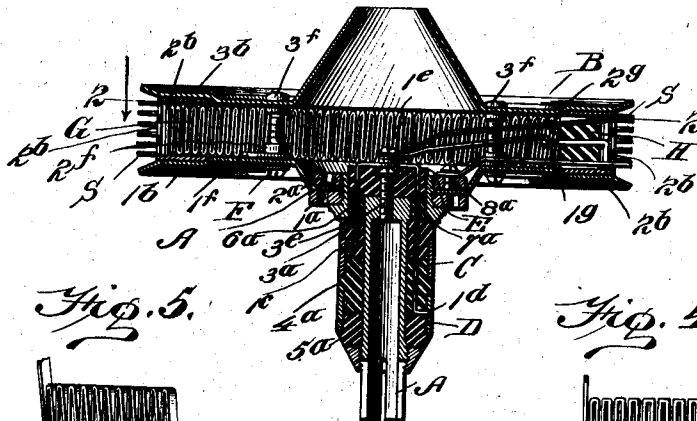


Fig. 5.



Fig. 4.



Fig. 2.

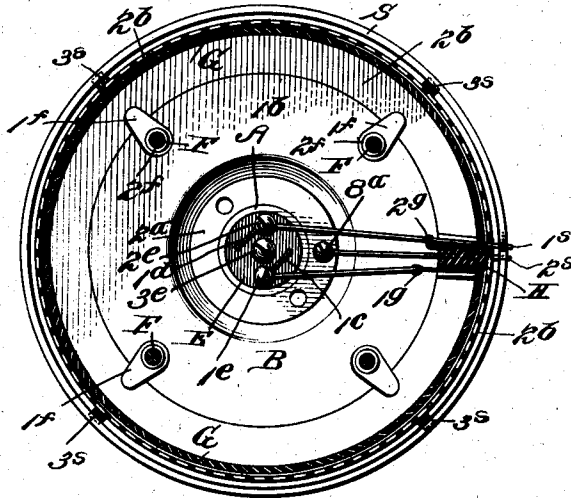
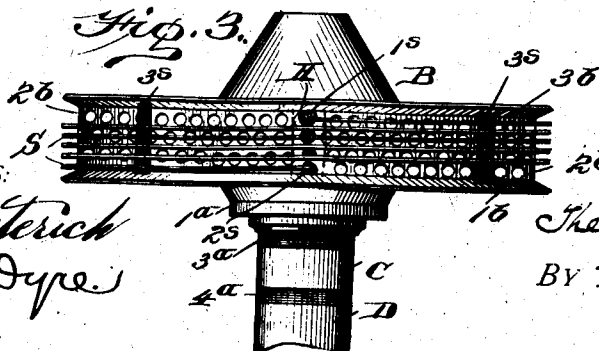


Fig. 3.



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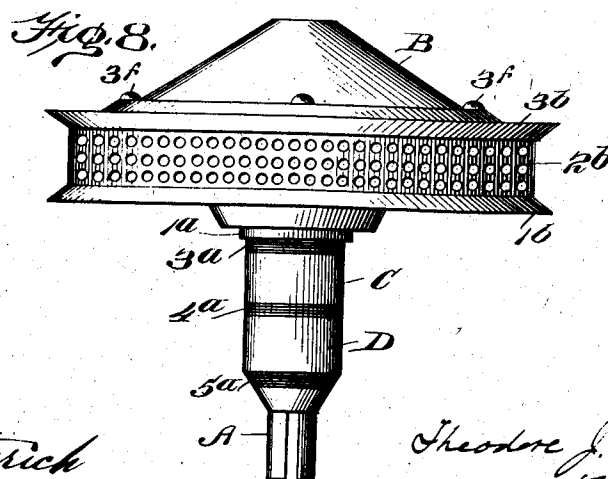
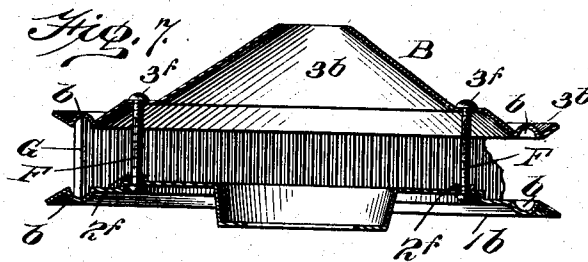
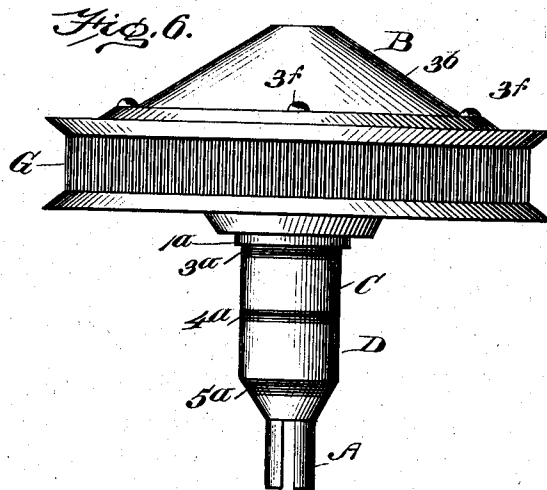
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2 SHEETS—SHEET 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## CENTRIFUGAL MELTING DEVICE.

No. 816,055.

Specification of Letters Patent.

Patented March 27, 1906.

Application filed October 11, 1904. Serial No. 228,071.

*To all whom it may concern:*

Be it known that I, THEODORE J. ZOELLER, a citizen of the United States, residing at Nashville, in the county of Davidson, State of Tennessee, have invented certain new and useful Improvements in Centrifugal Melting Devices; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical central section of a mechanism embodying my invention. Fig. 2 is a section on the line 2 2, Fig. 1, looking in the direction of the arrow, a modified form of heater-screen illustrated in Fig. 5 being substituted for the preferred form as shown in Fig. 4. Fig. 3 is a side elevation of the device. Fig. 4 is a view showing a portion of the preferred form of heater or screen. Fig. 5 is a view showing a fragment of a modified form of heater or screen. Fig. 6 is a side elevation of a form of my invention wherein is omitted the intermediate perforate member which forms a housing for the retaining heater-screen and which is interposed between the upper and lower members of the revoluble receptacle, said view also illustrating a form of upper member of the revoluble receptacle which permits easy inspection of all parts of the interior of the device and the facile introduction of a cleaning-brush or the like. Fig. 7 is a vertical transverse section of the revoluble receptacle shown in Fig. 6, a portion of the retaining heater-screen being broken away to more clearly show the channels or grooves within which said heater is confined. Fig. 8 is a side elevation of a revoluble receptacle and attached shaft suitable for use in practicing my invention, illustrating the application of an upper member, such as shown in Fig. 6 to the construction shown in Fig. 3 and also illustrating the applicability of a perforated intermediate member to the construction shown in Figs. 6 and 7. Like symbols refer to like parts wherever they occur.

My invention relates to that class of centrifugal devices primarily designed to transmute into filaments or a filiform mass, those substances which liquefy upon the application of heat, and has for its object such a construction and arrangement of its several elements that the product shall be uniform and

the device economic and efficient in operation. Hitherto in the operation of such devices in the manufacture of candy from granulated sugar the revoluble receptacle in which the sugar is contained has been heated throughout and the sugar maintained in a molten state, such molten sugar being caused by centrifugal action to pass through small openings or serrations in the periphery of a rotating receptacle, thus forming the desired filiform mass. Devices operating in this manner, however, are wasteful by reason of the fact that but a small amount of the heat thus supplied is utilized as necessary heat and are objectionable in that the product is unreliable, being more often scorched than otherwise, such scorching of the product resulting from the continued application of the intense heat to a gradually-diminishing quantity of the molten sugar. Devices so heated are further objectionable in that all sugar once melted must be converted into filaments without allowing such molten sugar to cool and harden, as in the latter event the product is scorched in the reheating.

To overcome the objections before noted, I combine with a suitable receptacle means for localizing the applied heat to a limited zone, thereby, in effect, maintaining a constant ratio between the amount of sugar or other material to which heat is supplied and the amount and intensity of such heat, and such a combination embodies the main feature of my invention.

A second feature of my invention resides in combining with a suitable receptacle a screen of such fineness of opening as to retain the material to be operated upon, said screen being adapted to supply heat to such material.

A third feature of my invention resides in combining with a revoluble receptacle having a localized heated zone an auxiliary screen which is adapted to be heated either intermittently or continuously.

There are other minor features of invention all as will hereinafter more fully appear.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

In the drawings chosen for the purpose of illustrating my invention the scope whereof

is pointed out in the claims, A is a split sleeve-shaft or shaft-coupling adapted to engage the shaft of a suitable motor (not shown) of any well-known construction; but, if desired, any other means of attachment to the motor may be employed or any other means of revolving the device may be utilized. Mounted upon the upper end of the coupling A and preferably secured thereto between the collars or nuts 1<sup>a</sup> 2<sup>a</sup>, which engage said coupling, is the lower member 1<sup>b</sup> of the retaining-receptacle B, and said shaft or shaft-coupling A is also provided with collector or transmitting rings C D, which are insulated therefrom and from each other by the insulating-rings 3<sup>a</sup> 4<sup>a</sup> 5<sup>a</sup> and insulating-spools, tubes, or cylinders 6<sup>a</sup> 7<sup>a</sup>, or in other suitable manner. The transmitting or collector ring C is preferably electrically connected to the binding-post 1<sup>e</sup> by means of the wire 1<sup>c</sup>, which is embedded in the ring of insulating material 3<sup>a</sup> and in the insulating-tube 6<sup>a</sup>, and the transmitting-ring D is connected by the wire 1<sup>d</sup>, which passes through insulating-rings 3<sup>a</sup> 4<sup>a</sup> and insulating-tube 7<sup>a</sup>, with the binding-post 2<sup>e</sup>, said binding-posts 1<sup>e</sup> and 2<sup>e</sup> being mounted on the plug or cap E, which is of insulating material and is or may be secured to the upper end of the shaft-coupling A by a screw 3<sup>e</sup> or in other suitable manner.

The receptacle B, which is a containing means for the material operated upon, is preferably constructed of a lower member 1<sup>b</sup>, an upper member 3<sup>b</sup>, having a centrally-disposed orifice therein for the introduction of the material to be operated upon, and an intermediate or interposed section 2<sup>b</sup>, the latter being preferably of an insulating material or having an insulating-coating, such as enamel, and having a perforated vertical face and upper and lower lateral flanges, within which the ribbon screen-heater is housed; but, if desired, the intermediate section 2<sup>b</sup> may be omitted and other means of maintaining the proper spaced or separated relation of the upper and lower sections of the receptacle B may be employed, the heater-screen G peripherally closing the opening between them and retaining the material to be acted upon. A construction such as the latter is illustrated in Figs. 6 and 7, wherein the lower member 1<sup>b</sup> and the upper member 3<sup>b</sup> of the receptacle B are preferably each provided with a channel or groove b, within which the retaining heater-screen G is confined, said screen G being insulated from the lower and upper members of the receptacle B in any suitable manner, but preferably by coating such members 1<sup>b</sup> and 3<sup>b</sup>, or at least the channels or grooves b thereof, with an insulating material, such as enamel. When, however, an intermediate member 2<sup>b</sup> is employed, the lower lateral flange thereof rests upon the lower member 1<sup>b</sup> of the receptacle B and is secured thereto by the elongated washers 1<sup>f</sup> 1<sup>f</sup>, which engage such lateral flange and which are held in position by nuts 2<sup>f</sup> 2<sup>f</sup> upon the screws F F, which pass upwardly through the said lower member 1<sup>b</sup>, by which means the intermediate perforated member 2<sup>b</sup> may be readily disengaged from the lower member 1<sup>b</sup> by a partial rotation of said elongated washers, should such disengagement be necessary or desirable for cleaning the device or for any other purpose. The screws F F also pass through the upper member 3<sup>b</sup> of the receptacle B and serve through the nuts 3<sup>f</sup> 3<sup>f</sup> to retain said upper member in engagement with the upper flange of the intermediate member 2<sup>b</sup>; but, if desired, any other suitable means of connecting the several sections may be employed.

Housed within the intermediate sections and protected by the lateral flanges of the intermediate member 2<sup>b</sup> of the receptacle B is the heater-ribbon screen G, which is preferably constructed of square wire alternately folded in opposite directions to form a ribbon occupying the space between the lateral flanges of such intermediate member, the openings in such screen being of such size or fineness as to prevent the escape of any of the material to be operated upon in its raw state or without having been first reduced to a molten or liquid condition; but in lieu of forming the heater-ribbon screen of square wire the same may be formed in other manner—as, for example, by folding a flat band of broad wire in a zigzag manner, as indicated in Figs. 2 and 5. The heater ribbon or band thus formed comprises two contiguously-arranged series of sections extending in parallelism at opposite angles of obliquity, the individual sections of each series being parallel and connected at their ends to sections of the other series. The opposite ends 1<sup>s</sup> 2<sup>s</sup> of the heater-screen G are insulated from each other by the block of insulating material H, in which they are secured, and such ends 1<sup>s</sup> 2<sup>s</sup> are electrically connected to the binding-posts 1<sup>e</sup> and 2<sup>e</sup>, respectively, preferably by short lengths of wire soldered to the ends of said heater-screen.

When the device is exposed to cold during its operation, the auxiliary heater-screen S, which will be presently described, is so arranged and connected electrically that it may be maintained at a low heat or may be intermittently heated in order that the clogging of the perforated band 2<sup>b</sup> or of the auxiliary heater itself, due to the chilling of the material thereon, may be prevented or overcome.

If at any time or for any reason it is desired to clean the device from material which may have adhered thereto after being melted, current may be increased sufficiently through the auxiliary heater S to again melt such material and cause it to flow off, leaving the device perfectly clean.

In order to prevent clogging of the perforated member 2<sup>b</sup>, it is necessary to maintain the heater-screen G at a temperature sufficiently above the melting-point of the material operated upon as will permit such molten material to pass over or through said perforated band 2<sup>b</sup> without chilling below the point at which it is spun into filaments; but after the device has been operated continuously for a considerable length of time under these conditions the intermediate perforated member 2<sup>b</sup> becomes heated to such a degree that part of the molten material flows directly from the retaining heater-screen without being sufficiently chilled, and hence does not assume the desired filiform structure. If under these latter conditions the heat supplied to the heater-screen G is diminished, the chilling effect upon the molten material sets in, producing an attendant clogging of the intermediate perforate member 2<sup>b</sup>, and the output of the device is greatly reduced. By employing an auxiliary heater, however, the heater-screen G may be maintained at a temperature sufficiently high to readily reduce the material operated upon to a molten state yet at a somewhat lower temperature than is necessary when such auxiliary heater is not employed, the heat supplied to such auxiliary heater being independently regulated and controlled to maintain the desired fluidity of the material operated upon, but being so graduated as to preserve said auxiliary heater at a lower temperature than the primary heater-screen G. With respect to the period of duration of the current-flow through such auxiliary heater and the amount of heat supplied, it is to be noted that the temperature and condition of the surrounding atmosphere are controlling conditions, since the difference in temperature between the point at which the material operated upon will be spun into filaments and the surrounding current of air varies, and the melting-points of hygroscopic substances themselves vary with the humidity of the atmosphere.

Upon the outside of the receptacle B in such manner that the molten material passes therethrough an auxiliary heater-screen S may be arranged, such auxiliary heater being preferably formed of wire of flat or other suitable form of cross-section wound upon the periphery of the perforated member 2<sup>b</sup> in a plurality of circumferential turns to form a helical screen of the desired size of opening, the ends 1<sup>s</sup> 2<sup>s</sup> whereof pass inwardly through the perforations of the said intermediate member 2<sup>b</sup> of the receptacle B and through the insulating-block H. The auxiliary heater-screen S is preferably covered in like manner with the member 2<sup>b</sup> with a coating of enamel having a coefficient of expansion equal or approximately equal to that of the material of which the screen is composed in order that

such enamel may not scale off when heated, and such auxiliary heater-screen and perforated intermediate member 2<sup>b</sup> are preferably insulated and spaced from each other by lava blocks 3<sup>s</sup> 3<sup>s</sup> or in other suitable manner. One of the ends or terminals 1<sup>s</sup> of the auxiliary heater-screen S is or may be connected to one of the binding-posts, as 2<sup>s</sup>, carried by the insulating-plug E, while the other end or terminal 2<sup>s</sup> of such heater-screen S is connected to a binding-post 8<sup>s</sup>, carried by the shaft coupling member A; the primary heater-screen circuit and the auxiliary heater-screen circuit thus having a common return-circuit; but, if desired, the said auxiliary heater-screen S may have other means whereby it may be heated as occasion may demand.

The electrical energy supplied to the heater-screen G for the purpose of heating the same may be led in through brushes (not shown) contacting the collector or transmitting rings, and the circuit for the auxiliary heater S may be completed through a similar brush (not shown) contacting the shaft-coupling A, or current may be supplied through the shaft of the motor, and thence through the shaft-coupling A to the auxiliary heater S.

As a matter of information and not as limitation, I would state that I revolve the containing-receptacle at about two thousand revolutions per minute and form the heater-screen G of a wire which is square or nearly so in cross-section.

The construction being substantially such as hereinbefore pointed out the operation of the device will be as follows: The receptacle B being charged with the granulated or powdered sugar or other material to be operated upon and being revolved rapidly the material is centrifugally forced into contact with the retaining heater-screen G, which is simultaneously heated to the proper degree by passing a current of electricity therethrough. Such material as at any instant is contiguous to the retaining heater-screen G is thus reduced to a molten state, in which condition it may escape through the interstices of said screen and be then thrown off in filiform fragments from the periphery of the revolving device after passage through the intermediate perforated member 2<sup>b</sup> and auxiliary heater S.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a centrifugal melting device, the combination with a receptacle, of means for applying heat thereto in a localized zone, substantially as and for the purposes specified.

2. In a centrifugal melting device, the combination with a revoluble receptacle, of means for applying heat thereto in a peripherally-localized zone, substantially as and for the purposes specified.

3. In a centrifugal melting device, the

combination with a receptacle, of a retaining-screen, and means for heating said screen, substantially as and for the purposes specified.

5 4. In a centrifugal melting device, the combination with a receptacle, of a square wire-heater ribbon, substantially as and for the purposes specified.

10 5. In a centrifugal melting device, the combination with a receptacle comprised of a plurality of members one of which is an interposed perforate member, of means for applying heat to said receptacle in a localized zone, substantially as and for the purposes specified.

15 6. In a centrifugal melting device, the combination with a receptacle comprised of a plurality of members one of which is an intermediate perforate member, of means for applying heat to said receptacle in a localized zone, and means for heating said perforate member, substantially as and for the purposes specified.

20 7. In a centrifugal melting device, the combination with a receptacle, of a heater within said receptacle, and an auxiliary heater arranged externally of said receptacle, substantially as and for the purposes specified.

30 8. In a centrifugal melting device, the combination with a revoluble receptacle, of a retaining heater-screen within said receptacle, and an auxiliary heater arranged externally of said receptacle, substantially as and for the purposes specified.

35 9. In a centrifugal melting device, the combination with a revoluble receptacle comprised of a plurality of members one of which is an intermediate perforate member, of a heater within said receptacle, and an auxiliary heater arranged externally of said receptacle and adjacent to said perforate member, substantially as and for the purposes specified.

40 10. In a centrifugal melting device, the combination with a receptacle comprised of upper and lower members separated or spaced with relation to each other, and a retaining heater-screen, substantially as and for the purposes specified.

50 11. In a centrifugal melting device, the combination with a receptacle comprised of upper and lower members separated or spaced with relation to each other, and a retaining heater-screen interposed between such members adjacent to the peripheries thereof, substantially as and for the purposes specified.

55 12. In a centrifugal melting device, the combination with means for containing the material to be operated upon, of a primary heater, and an auxiliary heater arranged contiguously thereto, substantially as and for the purposes specified.

60 13. In a centrifugal melting device, the combination with means for containing the material to be operated upon, of a heater-screen, and an auxiliary screen adapted to be

heated, substantially as and for the purposes specified.

14. In a centrifugal melting device, the combination with means for containing the material to be operated upon, of means for 70 applying heat thereto in a localized zone, and an auxiliary heater-screen, substantially as and for the purposes specified.

15. In a centrifugal melting device, the combination with means for containing the 75 material to be operated upon, of means for applying heat thereto in a localized zone, and a screen adapted to be heated, substantially as and for the purposes specified.

16. In a centrifugal melting device, the 80 combination with a receptacle comprised of a lower member, an upper member having an opening therein and an intermediate perforate member, of means for securing said members together, a revoluble shaft or shaft- 85 coupling, means for securing the lower member of said receptacle to said shaft or shaft-coupling, and means for applying heat to said receptacle in a localized zone, substantially as and for the purposes specified.

17. In a centrifugal melting device, the combination with a receptacle comprised of a lower member, an upper member and an intermediate perforate member having a lateral 90 flange, of elongated washers engaging the lateral flange of said perforate member, means for securing said elongated washers to said lower member, a revoluble shaft or shaft-coupling secured to said lower member, and means for applying heat to said receptacle in 100 a localized zone, substantially as and for the purposes specified.

18. In a centrifugal melting device, the combination with a receptacle comprised of a lower member, an upper member and an intermediate perforate member, of a plurality 105 of collars for securing the said lower member to a shaft or shaft-coupling, a shaft or shaft-coupling having collector-rings insulated therefrom and from each other, and a heater 110 electrically connected to said collector-rings and adapted to apply heat to said receptacle in a localized zone, substantially as and for the purposes specified.

19. In a centrifugal melting device, the 115 combination with means for containing the material to be operated upon, of a heater, and a helical auxiliary heater-screen, substantially as and for the purposes specified.

20. In a centrifugal melting device, the 120 combination with means for containing the material to be operated upon, of a heater, and a helical screen adapted to be heated, substantially as and for the purposes specified.

21. In a centrifugal melting device, the 125 combination with a receptacle comprised of a lower member, an upper member and an intermediate perforate member, of a plurality of collars for securing the said lower member 130

to a shaft or shaft-coupling, a shaft or shaft-coupling having collector-rings insulated therefrom and from each other, a heater electrically connected to said collector-rings and adapted to apply heat to said receptacle in a localized zone, and an auxiliary heater electrically connected to said shaft or shaft-coupling and to one of said collector-rings, substantially as and for the purposes specified.

22. In a centrifugal melting device, the combination with means for containing the material to be operated upon, of a heater-ribbon in an electrical circuit, and an auxiliary heater in an electrical circuit, said circuits having a common return, substantially as and for the purposes specified.

23. In a centrifugal melting device, the combination with a revoluble receptacle, of a retaining-screen, and means whereby said screen may be electrically energized when said receptacle is revolved, substantially as and for the purposes specified.

24. In a centrifugal melting device, the combination with a screen adapted to be heated electrically, of an insulating-housing for said screen, substantially as and for the purposes specified.

25. In a centrifugal melting device, the combination with a revoluble receptacle, a revoluble shaft or shaft-coupling, means for securing said receptacle to said shaft or shaft-coupling, and means for applying heat to said receptacle in a localized zone, substantially as and for the purposes specified.

26. In a centrifugal melting device, the combination with a receptacle, of a shaft or shaft-coupling, a plurality of collars for securing said receptacle to said shaft or shaft-coupling, a plurality of collector-rings carried by said shaft or shaft-coupling and insulated therefrom and from each other, and a heater electrically connected to said collector-rings and adapted to apply heat to said receptacle in a localized zone, substantially as and for the purposes specified.

27. In a centrifugal melting device, the combination with a receptacle, of a shaft or shaft-coupling, a plurality of collars for securing said receptacle to said shaft or shaft-coupling, a plurality of collector-rings carried by said shaft or shaft-coupling and insulated therefrom and from each other, and a square wire retaining-screen heater electrically connected to said collector-rings and adapted to apply heat to said receptacle in a localized zone, substantially as and for the purposes specified.

28. In a centrifugal melting device, the combination with a receptacle comprised of a lower member, an upper member and an intermediate perforate member having lateral flanges, of a plurality of collars for securing the said lower member to a shaft or shaft-coupling, a shaft or shaft-coupling having collector-rings insulated therefrom and from

each other, a square wire retaining-screen heater electrically connected to said collector-rings, and an auxiliary heater arranged externally of said receptacle and adjacent to said perforate member, substantially as and for the purposes specified.

29. In a centrifugal melting device, the combination with a receptacle comprised of a lower member, an upper member having an opening therein and an intermediate perforate member having a lateral flange, of elongated washers engaging the lateral flange of said perforate member, means for securing said elongated washers to said lower member, a plurality of collars for securing the said lower member to a shaft or shaft-coupling, a shaft or shaft-coupling having collector-rings insulated therefrom and from each other, and a heater electrically connected to said collector-rings and adapted to apply heat to said receptacle in a localized zone, substantially as and for the purposes specified.

30. In a centrifugal melting device, the combination with a receptacle comprised of a lower member, an upper member having an opening therein and an intermediate perforate member having a lateral flange, of elongated washers engaging the lateral flange of said perforate member, means for securing said elongated washers to said lower member, a plurality of collars for securing the said lower member to a shaft or shaft-coupling, a shaft or shaft-coupling having collector-rings insulated therefrom and from each other, a heater electrically connected to said collector-rings and adapted to apply heat to said receptacle in a localized zone, and an auxiliary heater-screen arranged externally of said receptacle and adjacent to said perforate member, substantially as and for the purposes specified.

31. In a centrifugal melting device, the combination with means for containing the material to be operated upon, of heating means for the material operated upon, such heating means being adapted to maintain a constant ratio between the amount of material to which heat is supplied and the intensity of such heat, substantially as and for the purposes specified.

32. In a centrifugal melting device, the combination with means for containing the material to be operated upon, of heating means for the material operated upon, such heating means being adapted to maintain a constant ratio between the amount of material to which heat is supplied and the amount of such heat, substantially as and for the purposes specified.

33. In a centrifugal melting device, the combination with means for containing the material to be operated upon, of heating means for the material operated upon, such heating means being adapted to maintain a constant ratio between the amount of mate-

rial to which heat is supplied and the amount and intensity of such heat, substantially as and for the purposes specified.

34. In a centrifugal melting device, the combination with means for containing the material operated upon, of a plurality of contiguously-arranged heaters adapted to supply heat to the material operated upon and to be maintained at different temperatures, substantially as and for the purposes specified.

35. A device of the character described, comprising a horizontally-rotatable casing having circular, insulating top and bottom sections, an electrically-heated conductor supported between said sections, and a circumferential, perforated, insulating-wall connecting said sections, said wall surrounding said conductor and affording a transverse support therefor, substantially as described.

36. In a device for making spun-sugar candy, a rotary spinner-head comprising spaced plates or disks and a band of wire uniting the peripheries of said plates or disks.

37. A device of the character described, comprising a rotatable vessel having a circumferential discharge-passage, and an elec-

trically-heated band in said passage composed of two contiguously-arranged series of sections, the respective sections of each series extending in parallelism, and each section of one series being connected at each of its ends to the end of a section of the other series, substantially as described.

38. A device of the character described, comprising a rotatable vessel having a circumferential discharge-passage, and an electrically-heated band in said passage composed of two contiguously-arranged series of sections, the sections of each series respectively extending transversely of the band in parallelism at opposite angles of obliquity, and each section of one series being connected at each of its ends to the end of a section of the other series, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses, this 8th day of October, 1904.

THEODORE J. ZOELLER.

Witnesses:

JOHN P. STEINER,  
J. A. FLOERSH.