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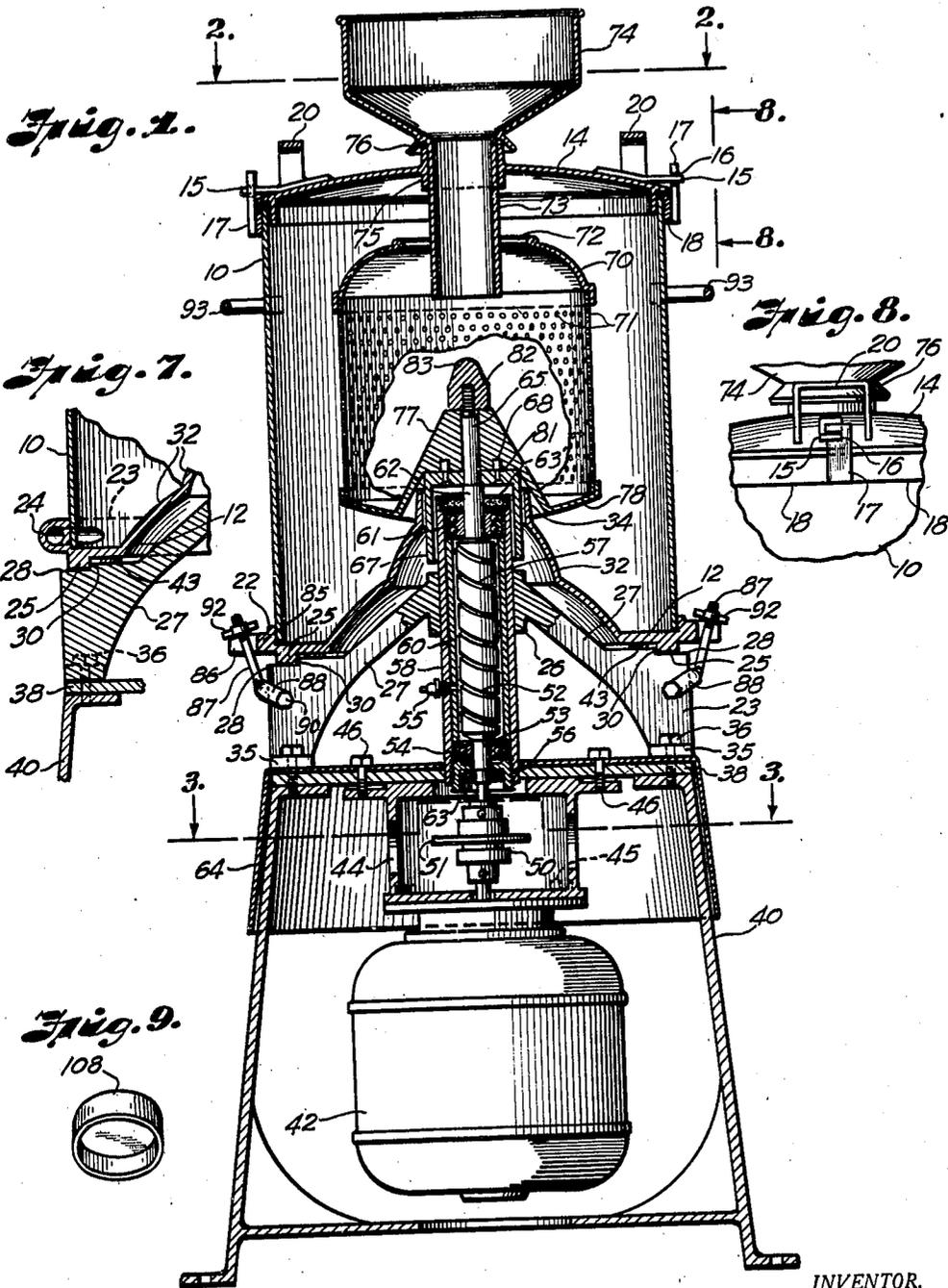
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2,343,694

BLOOD-SEPARATING MACHINE FOR SERUM PRODUCTION

Filed March 19, 1941

2 Sheets-Sheet 1



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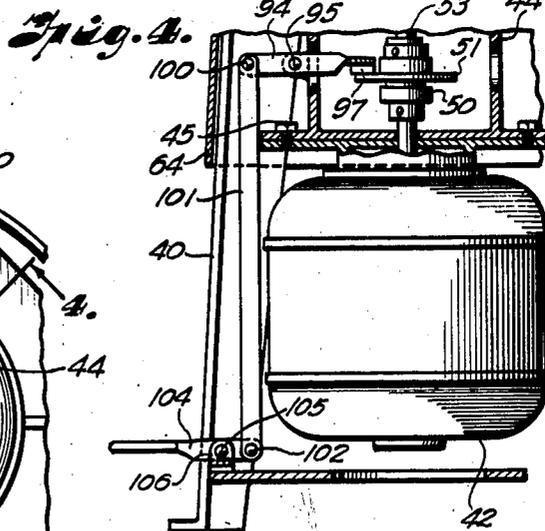
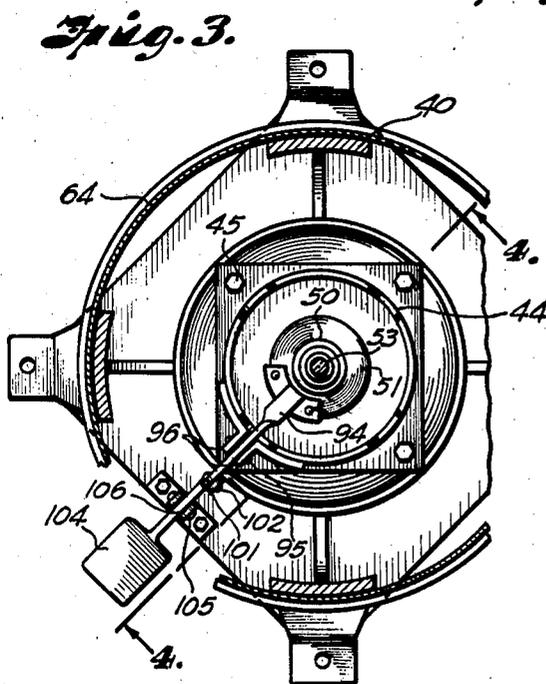
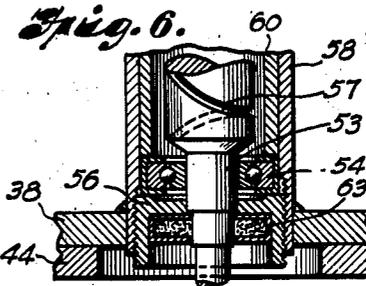
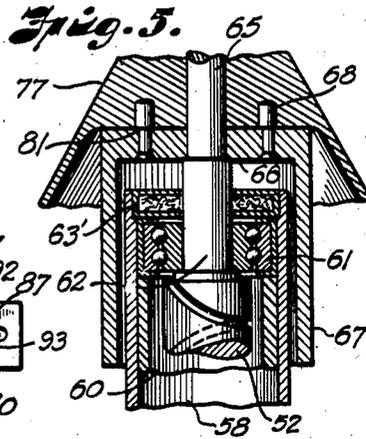
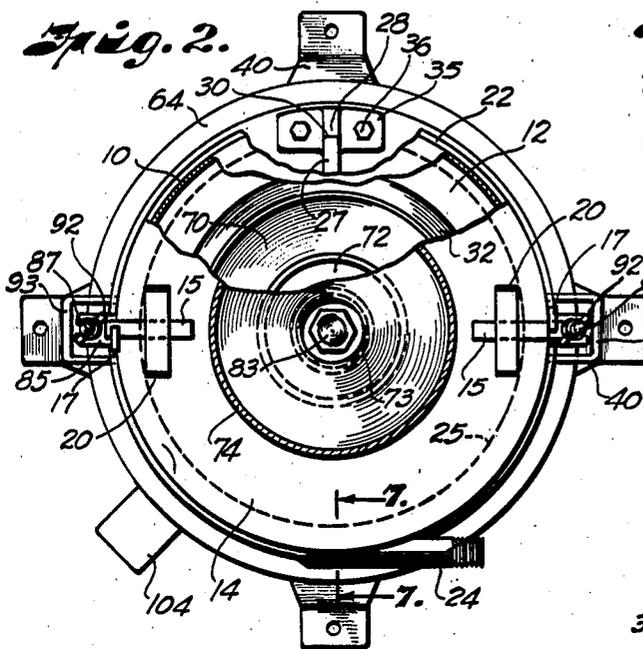
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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

2,343,694

## BLOOD-SEPARATING MACHINE FOR SERUM PRODUCTION

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Application March 19, 1941, Serial No. 384,061

2 Claims. (Cl. 210—63)

The present invention relates to apparatus or equipment of the character used by serum manufacturing plants, and aims to provide a more efficient and economical machine for extracting, by centrifugal action, the serum content of the materials handled by such machines.

The present invention therefore has for its primary object an improved machine operating on the centrifugal principle and providing a construction in which an improved and more efficient drive relation is utilized between the rotating container or receptacle which produces the serum extracting function; and also an improved apparatus in which all the parts are of a thoroughly sanitary construction and including an effective control means for regulating the operation of the machine.

Further objects of the invention are to provide a rotary serum extracting or separating chamber or receptacle of improved construction and adapted for high speed operation, thereby greatly increasing the production or working capacity of the machine.

Various other features of improvement have also been devised in the type of apparatus referred to, which will hereinafter be described in detail.

With the foregoing general objects in view the invention will now be more specifically described by reference to the accompanying drawings illustrating a practical form of apparatus for embodying my proposed improvements, after which those features and combinations deemed to be both novel and patentable will be particularly set forth and claimed.

In the accompanying drawings—

Figure 1 is a vertical sectional elevation illustrating an apparatus constructed in accordance with the present invention;

Figures 2 and 3 are horizontal sectional views, representing sections taken on the lines 2—2 and 3—3, respectively, of Figure 1;

Figure 4 is a vertical sectional view representing a section taken on the line 4—4 of Figure 3;

Figures 5 and 6 are enlarged vertical sectional detail views of the bearing assemblies at the upper and lower ends, respectively, of the main vertical shaft member of the apparatus;

Figure 7 is a sectional detail view representing a section taken on the line 7—7 of Figure 2;

Figure 8 is a fragmentary detail elevation illustrating one of the latch structures for the top cover member; and

Figure 9 is a perspective view showing a cap

element used in the operation as hereinafter explained.

The present invention relates to improvements in apparatus of the character illustrated in Patent No. 1,797,876, dated March 24, 1931, for use in serum extracting operations.

Referring now to the drawings in detail, the present improved apparatus is illustrated as comprising an outer container or receptacle structure made up of an upright cylindrical drum member 10 having a bottom or base casting member 12 and a top or cover member 14 adapted to be secured in closure relation to the top of the drum 10 by latching means at opposite sides of the cover. Each of said latching means comprises a latch bar 15 carried by the cover member and adapted to engage a slot 16 formed in a latch piece 17 secured in upright position outside a band 18 encircling the top edge of the drum member 10.

A U-shaped handle member 20 is also secured to the top of the cover member over each of said latch bars 15, as shown in Figure 8; and the latch pieces 17 are so arranged that after placing the cover member in closure position, on top of the drum, a slight rotation of the cover will effect simultaneous latching engagement of both of the latching structures, in an obvious manner.

The bottom of the base casting member 12 is formed with an upstanding marginal flange 22 secured to the lower edge of the drum 10 and provided with a substantially tangent outlet or discharge opening 24, as illustrated in Figures 2 and 7. The bottom face of said casting 12 is also formed with base rests 25 for mounting the receptacle structure upon a supporting framework 23 comprising a central hub portion 26 and a plurality of outwardly and downwardly extending legs 27 which are formed with supporting ledges 28 for the base rests 25 and with shoulders 30—with which shoulders said rests 25 also engage for positioning the receptacle centrally upon the framework 23. Within the drum the frame or casting 12 is of reentrant form, having an approximately dome-shaped contour providing a succession of outwardly and downwardly extending curved surfaces 32, and its inner central portion is cylindrical, forming a sleeve or collar as indicated at 34 in Figure 1.

The lower ends of the legs 27 are formed with foot portions 35 anchored by means of screws 36 to a plate 38, by means of which screws said plate is also secured to the top of a base frame or stand 40, which is open at its sides (Figures 1

and 3) and is adapted to house a suitable electric motor 42. This motor is supported in suspended relation within said frame by means of a hanger member 44 secured by screws 45 to the motor, and also by screws 46 to the plate 38, as shown in Figure 1. Pad elements 43 are preferably interposed between the base casting 12 and legs 28, for cushioning purposes, as illustrated in Figures 1 and 7.

The drive shaft 47 of the motor 42 is connected by means of a conventional form of clutch assembly 50 to the lower end of a vertical shaft 52 which is formed with a lower journal portion 53 operating within a roller bearing assembly 54 supported by a cup or screw fitting 56 which is threaded into the lower end of an upright tubular housing 58 extending through the hub portion 26 of the frame 27 and having its lower end anchored to the center of the plate 38. Fitted within said housing 58 is a sleeve 60 supported on said bearing assembly 54, whereas the upper end of the sleeve supports a similar but somewhat larger ball bearing assembly 61 for the upper journal portion 62 of the shaft 52. Fitted within the lower cap fitting 56 is a grease retainer 63, and a similar grease retainer element 63' is also fitted within the upper end of said sleeve 65 on top of said bearing assembly 61—all as clearly illustrated in Figures 5 and 6.

A commercial type of grease fitting 55 is provided for feeding a suitable lubricant into the space surrounding the vertical shaft 52, which may be grooved spirally, as indicated at 57, for facilitating distribution of said lubricant longitudinally along the shaft.

For imparting a neater exterior finish, to this part of the structure, a cylindrical tub-shaped housing 64 may be applied, in inverted position, to the upper portion of the stand 40 before the frame 23 is secured in place by the screws 36, said housing having openings for suitably accommodating said screws as well as the base of the tubular housing 58.

The upper end of the shaft 52, above its journal portion 62, is formed with a reduced extension 65, leaving a shoulder 66 against which is removably seated a cup or shield member 67 which is inverted over the upper end of the tubular housing 58,—thus extending down through the central collar or sleeve portion 34 of the frame 12. To the top of this cup or shield member 67 is secured a set of upwardly projecting pins or dowels 68 which serve as means for connecting the inner rotary container or receptacle 70 in driven relation to the drive shaft 52.

This rotary receptacle 70 is of generally cylindrical form with relatively fine openings 71 and also a top opening 72 through which the neck 73 of a funnel 74 may be projected as required for feeding the blood-containing material, or "bleedings," into the machine—the neck 73 of the funnel being also projected through a short sleeve section 75 mounted centrally in the cover member 14 and in alignment with the vertical shaft 52—all as shown in Figure 1. Preferably the upper end of the funnel neck 73 is provided with a downwardly and outwardly projecting flange 76 adapted to function as a guard apron or baffle to prevent any drippings or other foreign matter entering the machine between said neck 73 and the sleeve section 75.

The bottom of the rotary receptacle 70 comprises a casting having a central dome-shaped portion 77, the lower part of which carries an outer downwardly projecting trough-shaped

portion 78 of approximately V-shape which is attached to the lower edge of the cylindrical perforated portion 70 of said receptacle. The dome-shaped portion 77 has a central opening 80 for the shaft extension 65, and its bottom face is also provided with openings 81 for the pins or dowels above referred to. The upper end of said shaft extension 65 is suitably threaded (as indicated at 82) for a screw cap or knob 83, whereby the parts may be clamped together, with said member 67 securely clamped into engagement with the shoulder 66 on the vertical drive shaft, as shown in Figure 5.

Provision is made for securing the drum member 10 removably upon the outer leg portions 27 of the supporting framework 23, for which purpose the base casting 12 is formed at diametrically opposite points with lugs 85 having recesses 86 for receiving the outer ends of screws 87, the other ends of which are forked, as indicated at 88, for pivotally mounting the same (as shown at 90) to the legs 27 of said framework. Thus the screws 87 are adapted for conveniently swinging into and out of the recesses 86, with which they are retained in latching engagement by nuts 92 threaded on the outer ends of the screws, as illustrated in Figures 1 and 2. At its opposite sides, the drum 10 is also provided with suitable handles 93 for convenience in lifting the drum on and off the framework 23.

A brake mechanism is also provided in connection with the aforesaid motor and its clutch, said mechanism comprising a lever 94 fulcrumed on a pin 95 mounted in brackets 96 secured to the hanger member 44 (see Figure 3), the inner end of said lever being provided with brake-facing material 97 for braking engagement with the upper face of the disk or flange 51 forming part of the clutch assembly 50 already referred to. The outer end of the lever 94 is pivoted at 100 to the upper end of an operating link 101, the lower end of which is pivotally connected at 102 to a foot pedal member 104 which is fulcrumed at 105 to brackets 106 at the base of the frame or stand 40 (see Figure 4).

In the operation of the machine, all the working parts likely to come in contact with the serous material are sterilized in the usual manner, such parts including the structure of the outer receptacle, its cover and the funnel 74, and the inner rotary receptacle and its anchoring nut 83. After such sterilization the parts are assembled into the operative position illustrated in Figure 1, and in this connection the shaft 52 may be held stationary (by means of the brake lever and its connections) while said nut 83 is being screwed on and tightened.

The motor is then started, and is first run at a relatively low speed while the "bleedings" containing the blood serum are poured through the funnel 74 into the inner rotary receptacle 70. It will be apparent that the dome-shaped contour of the parts inside said inner receptacle (which are in alignment with the discharge from said funnel) serves to distribute said serous material, by diverting it substantially uniformly around the bottom of the receptacle. This prevents any clotted and lumpy portions of the material from collecting in uneven masses about the axis of rotation, which would tend to produce vibration and otherwise interfere with proper separating action.

This pouring of the material into the machine thus continues while the machine remains in low-speed operation, due to the provision of

the funnel which remains in the material-feeding position shown in Figure 1. After a sufficient quantity of the material, or "bleedings," has been introduced into the inner rotary receptacle, the funnel is removed and a closure cap 108 (see Figure 9) is fitted over the outer end of the sleeve section 75. The operation is then speeded up to a full normal speed and such high speed operation continued for a period of some three to four minutes. The operation may then be slowed down or stopped by the brake control through the lever 104, applying a braking action of the disk 51.

The separating action is of course produced by the centrifugal effect resulting from the rotation of the receptacle 70, as is characteristic of machines of this type, and the separated serous fluid or blood serum is drawn off by way of the tangential discharge outlet 24 into a receptacle (not shown) placed in receiving position beneath said discharge outlet, which may have a suitable spigot or faucet (not shown) attached thereto. The tangential relation of said discharge outlet 24 to the bottom of the drum 10 of course greatly facilitates the discharge of the liquid from the drum after separation.

During the interval between separating operations of the machine, the cover structure is lifted off to allow the residue of fibrine remaining in the receptacle 70 to be removed, as by the use of forceps or the like in the usual manner, after which the cover is replaced in closure position, ready to repeat the separating operation on a fresh batch of the material.

It will therefore be seen that I have devised an improved type of machine which is sanitary in every detail as to both the construction of the apparatus and its operation, and that the operation is moreover adapted to be carried out in not only a continuous but also a more efficient manner than heretofore. For in addition to the protection against foreign matter ever finding its way into either the outer or inner receptacles through the cover structure, it is obvious that it is practically impossible for any grease or other matter to enter into the lower portion of the outer receptacle because of the shielded construction surrounding the upper bearing structure at the hub portion 34 of the bottom casting 12.

Again, the higher speed which is rendered possible by the drive arrangement also results in an increased capacity, for a rotating container 70 with finer openings 71 can be employed for the screening or separating action; and this fact, together with the continuous feeding made possible by the use of the funnel 74 mounted for feeding action during the low speed operation, and with the improved distributing action already referred to, has shown an increase in capacity to substantially double that characterizing prior constructions.

It is further to be noted that the improved design, including the new arrangement of the drive connections, provides the further advantage of economy in the floor space required for the machine and its operation, in contrast with that required for the prior machine.

Having therefore illustrated and described what is now regarded as the preferred form of apparatus suitable for the embodiment of the present improvements, I shall proceed to distinctly point out and define those features and combinations deemed to be novel and patentable; I desire to be understood, however, as expressly reserving the right to all changes or modifications which may fairly be deemed to fall within the spirit and scope of my invention as defined by the appended claims.

What I desire to secure by Letters Patent is:

1. A blood-separating machine for serum operations, comprising an outer stationary receptacle having its bottom formed with a re-entrant portion terminating in an upwardly projecting cylindrical collar, an upright bearing structure extending upward within said collar and in spaced and concentric relation thereto, a vertical drive shaft supported by said bearing structure and projecting above said collar into said receptacle, an inverted cup member secured to the upper end portion of said drive shaft and telescopingly fitted within said collar and forming a shield enclosing the upper end of said bearing structure, an inner perforated receptacle fitted to the upper end portion of said drive shaft with the extreme upper end of the latter projecting up within and above the bottom of said perforated receptacle, and a nut element secured on said extreme upper end of the shaft and engaging the interior of the bottom of said perforated receptacle for removably clamping the same in clutching engagement with the upper face of said cup member.

2. A blood-separating machine for serum operations, comprising an outer stationary receptacle having its bottom formed with a re-entrant portion terminating in an upwardly projecting cylindrical collar, an upright bearing structure located within said collar and in spaced and concentric relation thereto, a vertical drive shaft supported by said bearing structure and projecting above said collar into said receptacle, said shaft being formed with a shoulder above the upper end of said bearing structure, an inverted cup member mounted on said shaft in engagement with said shoulder, said cup member being telescopingly fitted within said collar and forming a shield enclosing the upper end of said bearing structure, an inner perforated receptacle having its bottom portion removably fitted over the upper end of said drive shaft and upon said cup member with the extreme upper end of said shaft projecting up within and above the bottom of said inner receptacle, the engaging faces of said cup member and inner receptacle bottom having inter-engaging pins and recesses for removable clutching engagement of said cup member with said inner receptacle bottom, and a clamping nut carried by said extreme upper end of said drive shaft and operative to retain the cup member and inner receptacle bottom in clutched relation with said cup member seated against said shaft shoulder.

ELISABETH E. MITCHUM.