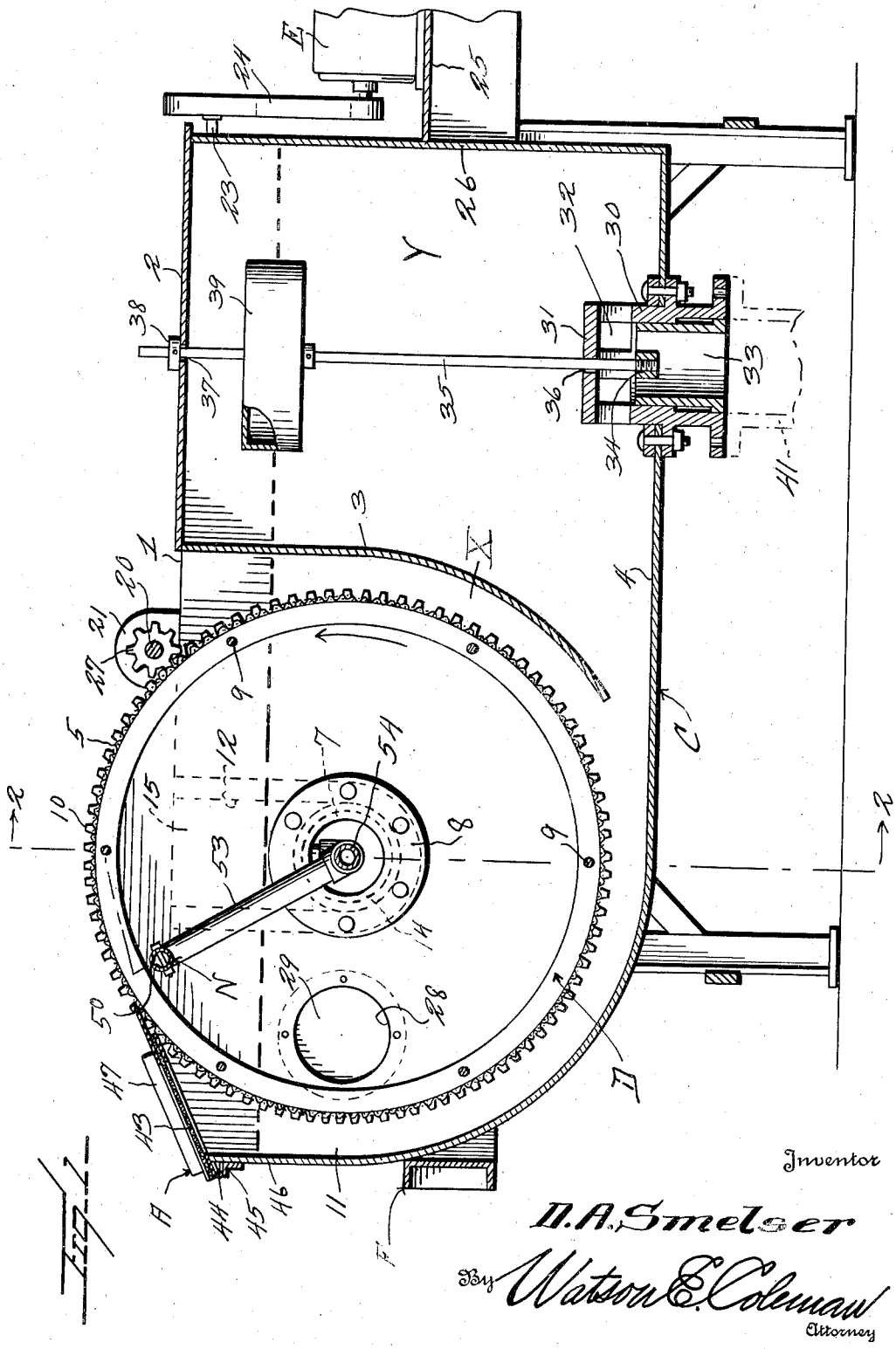
Feb. 20, 1940. D. A. SMELSER 2,191,122

LIQUID SEPARATOR OR SAVE-ALL

Filed March 1, 1938 2 Sheets-Sheet 1



Inventor

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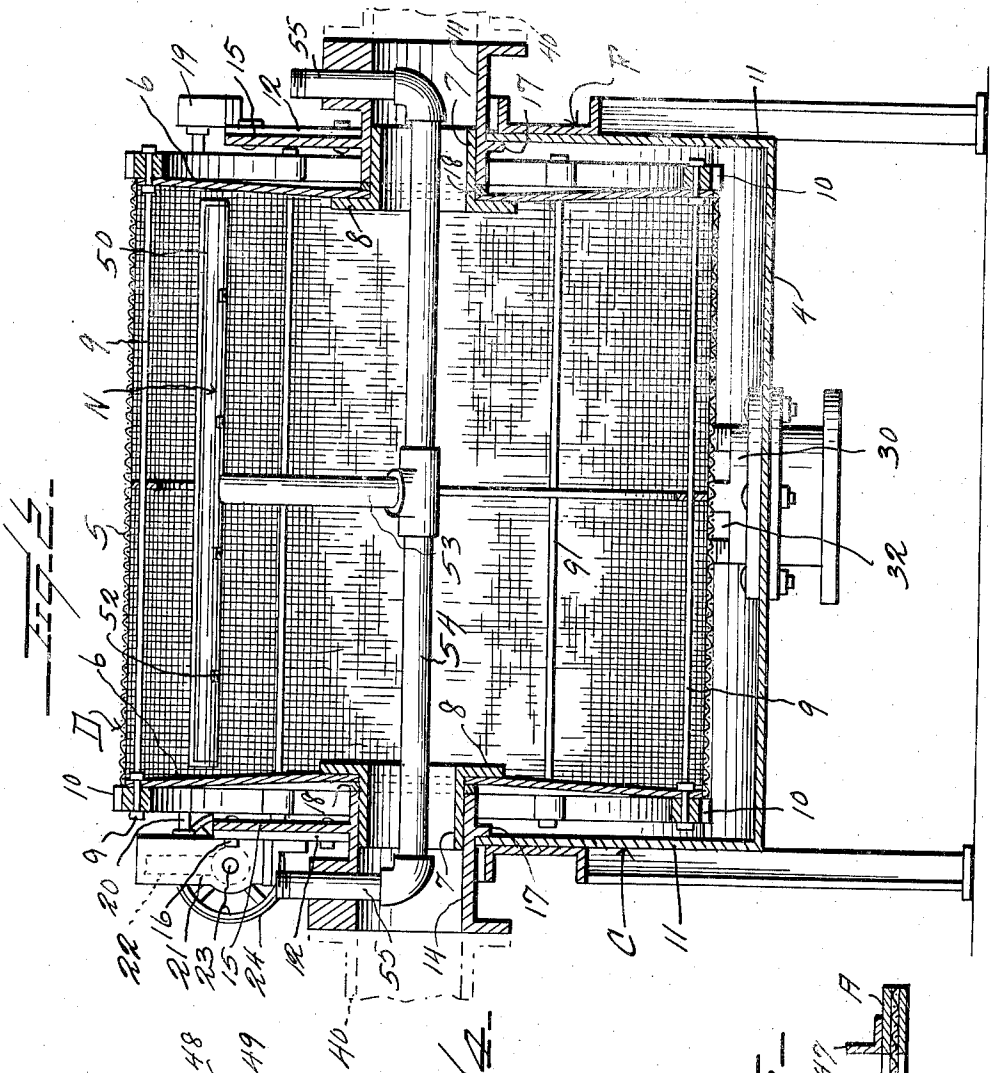
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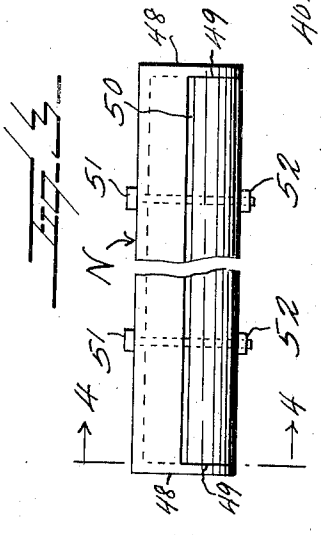
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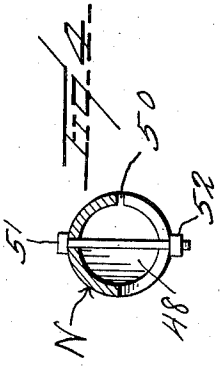
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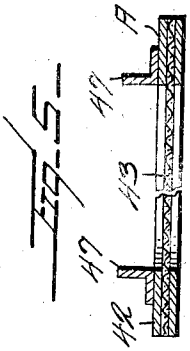
LIQUID SEPARATOR OR SAVE-ALL

Filed March 1, 1938 2 Sheets-Sheet 2









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UNITED STATES PATENT OFFICE

2,191,122

LIQUID SEPARATOR OR SAVE-ALL

David A. Smelser, Bristol, Tenn.

Application March 1, 1938, Serial No. 193,346

2 Claims. (Cl. 210—201)

This invention relates to a liquid separator or save-all, and it is primarily an object of the invention to provide an apparatus of this kind wherein the separating element comprises a rotary drum so mounted and assembled to substantially eliminate loss of liquid.

The invention also has for an object to provide an apparatus of this kind employing a rotary drum as a separating element, the peripheral wall of said drum being perforated together with means within the drum for directing upon said perforated wall a fluid under pressure to relieve such wall from clogging and to facilitate the desired carrying off of the foreign matter separated from the liquid.

An additional object of the invention is to provide an apparatus of this kind comprising a vat or container having mounted therein a rotatable separating drum together with an automatically controlled liquid inlet arranged to one side of the drum and wherein the outlet for the separated fluid leads from the interior of the drum.

The invention has for a further object to provide an apparatus of this kind wherein the separating drum is effectively supported or mounted without requiring the use of gland packings or the like.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved liquid separator whereby certain important advantages are attained and the device rendered simpler, less expensive and otherwise more convenient and advantageous for use, as will be hereinafter more fully set forth.

The novel features of my invention will hereinafter be definitely claimed.

In order that my invention may be the better understood, I will now proceed to describe the same with reference to the accompanying drawings, wherein—

Figure 1 is a vertical sectional view with parts in elevation taken through a liquid separator or save-all constructed in accordance with an embodiment of my invention;

Figure 2 is a sectional view taken substantially on the line 2—2 of Figure 1 with parts in elevation;

Figure 3 is an enlarged fragmentary view in top plan of the nozzle as herein disclosed;

Figure 4 is a sectional view taken substantially on the line 4—4 of Figure 3;

Figure 5 is a fragmentary sectional view taken longitudinally through the discharge apron or chute.

As disclosed in the accompanying drawings, C denotes a container or vat of desired configuration and capacity and which, as herein disclosed, is maintained at a desired elevation through the medium of a frame structure F. The container or vat C has one end portion 1 of its top open with the remaining portion of the top closed by a wall 2. Extending transversely across the container or vat C is a partition 3, said partition extending down from the inner end of the wall 2 to a point in close proximity to the bottom wall 4 of the container or vat with the lower portion of the partition 3 preferably disposed on a curvature substantially concentric to the peripheral wall 5 of the separating element or drum D. This wall 5 of the drum, as herein disclosed, comprises a wire mesh fabric of desired gauge welded or otherwise securely attached as may be preferred to the drum heads 6. These heads 6 possess a certain degree of inherent resiliency and extending outwardly through each of these heads 6 at the axial center thereof is a tubular trunnion 7 open at both ends. The inner end of the trunnion 7 is defined by an outstanding flange 8 to provide means for attachment of the associated head 6 to the trunnion. Bolted, as at 9, or otherwise secured to the peripheral portion of each of the heads 6 is an annular rack or gear 10.

The partition 3 hereinbefore referred to divides the container or vat into two compartments X and Y, the open top 1 being in communication with the compartment X. Each of the side walls 11 for the compartment X of the container or vat C is provided with a vertically disposed slot 12 open at the top of said wall and extending downwardly of the wall 11 a distance to be determined by the radii of the drum D and the height of the wall 11.

Insertible within the slot 12 through the upper open end thereof is a tubular bearing 14 carrying an upstanding plate 15 for closing the portion of the slot 12 above the applied bearing 14. This plate 15 laps the portions of the wall 11 defining the side margins of the slot 12 and said lapping portions are securely fastened by the bolts 16 or otherwise as may be preferred. The lower portion of the plate 15 is continued by a flange 17 which is continued around and under the bearing 14, said flange also lapping the portions of the wall 11 defining the adjacent margins of the slot 12. It is also to be stated that the lower end of the slot 12 is formed to conform with the

adjacent cross sectional configuration of the bearing 14.

Each of the bearings 14 before being applied has telescopically engaged therein a trunnion 7. Each of the heads 6 of the drum D is substantially coplanar and said heads are spaced apart a distance in excess of the distance between the inserted ends of the applied bearings 14. After the bearings have been properly assembled with respect to the trunnions 7 in order to place the bearings 14 within the slots 12, the central portions of the heads 6 will have to be forced inwardly so that when the drum D is in applied or working position within the compartment X, the heads 6 are concavo convex with the concave faces outwardly disposed. These heads 6 are of metal or other material possessing a certain degree of inherent resiliency and when the central portions thereof are forced inwardly said central portions have a natural tendency to return to their initial coplanar position. This action of the heads 6 serves to maintain an effective joint between the trunnions 7 and the bearings 14 without the use of gland packings or the like. To facilitate the action of the heads 6 in maintaining the joints I find it of advantage to surround the trunnions 7 between the heads 6 and the inner ends of the bearings 14 with suitable washers 18.

The drum D is of such diameter that when operatively mounted within the compartment X of the container or vat C it closely approaches the bottom wall 4 of the container or vat and with its upper portion extending up and beyond the upper open top 1. This drum D is also of a length to substantially bridge the space between the side walls 11.

It is also to be noted that the members 9 holding the racks or gears 10 to the heads 6 bridge the space between the peripheral portions of the heads 6 and are so constructed and arranged as to constitute spacing members for such peripheral portions of the heads 6. One of the side walls 11 carries a bearing bracket 19 extending above the open top 1 of the compartment X and in close proximity to the applied drum D. This bearing bracket 19 provides a mounting for one end portion of the shaft 20 which extends transversely across the top of the container or vat C with the opposite end portion rotatably supported by a housing 21. This housing 21 contains a conventional transmission, as indicated by broken lines at 22, whereby the shaft 19 is driven by an operating shaft 23. This shaft 23 may be driven in any manner preferred but, as herein disclosed, is in driven connection as at 24 with an electric motor E mounted upon a shelf 25 carried by an end wall 26 of the container or vat C, said motor E being connected to a desired source of electrical energy.

Each of the racks or gears 10 has meshing therewith a pinion 27 fixed to the shaft 20 whereby is effected the desired rotation of the drum D within the compartment X.

Each of the heads 6 is provided with a cleanout opening 28 normally closed in a conventional manner by a plate 29.

The bottom wall 4 has disposed therethrough a cylindrical casing 30 extending within the compartment Y. This casing has its upper or inserted end closed by a plate 31 and the side wall of the casing 30 immediately adjacent to the plate 31 is provided therearound with the eduction openings 32. Snugly engaged within the casing 30, free for sliding movement therein, is a tubular valve sleeve 33. This sleeve 33 is intersected by a bar or spider 34 to which is threaded or otherwise suitably affixed the lower end portion of a rod 35. This rod 35 extends upwardly and freely through the plate 31 and is of a length to extend through and above the top wall 2. The plate 31 and top wall 2 are provided with suitable openings 36 and 37 respectively to allow for such mounting of the rod 35. The portion of the rod 35 above the top wall 2 carries an enlargement or head 38 adjustably mounted thereon. This enlargement or head 38 constitutes a stop coacting with the top wall 2 to limit the extent of downward movement of the sleeve 33.

When the liquid within the container or vat C rises above a predetermined level the rod 35 will be caused to move upwardly under the action of the float 39 carried by the rod 35. The rod 35 will move upwardly to cause the sleeve 33 to close the eduction openings 32. As the fluid to be separated enters the container or vat C through the sleeve 33 and casing 30 it will at once be understood that should the liquid level within the container or vat rise above a predetermined height the openings 32 will be closed by the sleeve 33 and the ingress of the fluid stopped. Of course, as the level of the liquid returns to a predetermined height the sleeve 33 will move downwardly to permit the desired inlet of the fluid.

The fluid within the container or vat C readily enters the drum D through the perforated or reticulated wall 5 thereof. This wall 5, however, serves effectively to separate the foreign matter from the liquid so that as the liquid is discharged from the compartment X it will be substantially free of the impurities desired to be removed. The discharge of the separated liquid from the compartment X is out through the associated bearings 14 and trunnions 7. Each of the bearings 14 is adapted to have coupled thereto a carry-off pipe 40 as indicated by broken lines in Figure 2, leading to a suitable point of discharge.

The outer or lower end of the casing 32 is adapted to have coupled thereto a pipe line 41 as illustrated by broken lines in Figure 1 leading from the source of supply of the liquid to be separated. The matter separated from the liquid by the peripheral wall 5 of the drum D is carried upwardly as the drum rotates and is delivered to the discharge apron or chute A. This apron or chute A, as herein disclosed, comprises a frame 42 of desired dimensions and which frame carries a perforated or reticulated sheet 43 disposed over the central opening defined by the frame. This sheet 43 is preferably wire fabric of desired mesh. The frame 42 has one of its members hingedly connected, as at 44, to an outstanding ledge 45 carried by the end wall 46 adjacent to the drum D. When this apron or chute A is swung inwardly into working position as illustrated in Figure 1, the frame contacts with the upper edge of the end wall 46 whereby the apron or chute 43 is effectively supported on a downward and outward incline yet free of contact with the wall 5 of the drum D. The foreign matter separates from the liquid by the wall 5 of the drum D as the drum rotates, will pass out over the sheet 43 and such liquid as may also be discharged from the drum D will be returned through the fabric 43 to the compartment X. This is of advantage as the loss of liquid is minimized.

The chute or apron A adjacent to its ends is

provided with the upstanding side walls 47 to assure proper and effective discharge from the apron or chute A. It is also believed to be obvious that the chute or apron A is of such length as to have effective coaction with the drum D.

To facilitate the discharge of the separated matter carried by the wall 4 of the drum D and to also prevent such wall from becoming clogged by such separated matter, an elongated nozzle N is placed within the drum D closely adjacent to the peripheral wall 5 thereof and also in relatively close proximity to the apron or chute A. This nozzle N is of a length to substantially bridge the space between the heads 6 of the drum D and has each of its ends closed, as at 48. Immediately adjacent to its closed ends, the nozzle N has its peripheral wall slitted, as at 49, for a distance substantially one-half way therearound and the upper or outer ends of the slits 49 are connected by a slot 50 extending lengthwise through the wall of the nozzle. At predetermined points therealong the nozzle has disposed therethrough the headed members 51 having threaded thereon the nuts 52. As herein disclosed, the nuts 52 contact with the portion of the wall of the nozzle separated from the ends 48 thereof by the slits 49. By proper adjustment of the nuts 52 the width of the slot 50 may be adjusted so that desired regulation can be had of the flow of fluid out through the slot 50. The nozzle N at its central portion has in communication therewith the rigid tubular member 53 which is also in communication with and carried by the central portion of an elongated tubular member 54. As herein disclosed this member 54 is disposed substantially axially through the trunnions 7 and drum D and has its outer end portions coupled to and in communication with the inlet pipes 55. These pipes 55 are disposed through the walls of the outer portions of the bearings 14 whereby such bearings provide a means for maintaining the pipes 55 in applied or working position together with the nozzle N.

The member 53 is disposed upwardly on a predetermined angle toward the apron A so that the slot 50 of the nozzle will direct its jet out through the wall 4 of the drum D in a manner which will best assure the delivery of the foreign matter upon the wall 4 and the apron or chute A. Either or both of the supply pipes 55 is adapted to be connected to a suitable source of fluid under pressure. In practice, however, it is preferred that only one of these pipes 55 be so connected and with such a hookup the second pipe 55 will be capped or otherwise closed.

While the fluid to be delivered from the nozzle N may be liquid, steam, air, or gas, it is preferred that such fluid be liquid which has been discharged from the compartment X. The advantage of this resides in the fact that the liquid returning to the compartment X through the apron or chute A will not dilute, vary, or in any way effect the character of the liquid as it passes out from the compartment X.

From the foregoing description it is thought to be obvious that a liquid separator or save-all constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice except as hereinafter claimed.

I claim:

1. A machine of the class described including a container, a rotary drum comprising heads, a perforated peripheral wall carried by said heads, said heads possessing a certain degree of inherent resiliency, tubular trunnions extending outwardly from the central portions of the heads, said trunnions being in communication with the interior of the drum, opposed bearings carried by the container and extending inwardly thereof and with which the trunnions of the drum telescopically engage, the distance between the inner ends of the trunnions normally exceeding the distance between the inner ends of the bearings, the resiliency of the heads providing means to permit the trunnions to be moved inwardly of the drum a distance sufficient to engage the trunnions within the bearings, the resiliency of said heads also maintaining the trunnions in close sealing contact, said assembled trunnions and bearings providing outlets for the container, said container also having an inlet, and means for rotating the drum.

2. In a liquid separator, the combination with a rotatable drum having a peripheral wall; of an elongated nozzle within the drum closely adjacent to the peripheral wall thereof, said nozzle being in communication with a source of fluid under pressure, said nozzle comprising an elongated tubular member of a length to extend substantially from one head to the other of the drum, the ends of said member being closed, the wall of the member closely adjacent to the closed ends having circumferentially disposed slits extending a material distance therearound, said member having its wall provided with a slot extending lengthwise thereof from the end of one of the slits to the corresponding end of the second slit, and means engaging the portion of the wall between the slits of the member for varying the width of the slot.

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