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CENTRIFUGAL SEPARATOR

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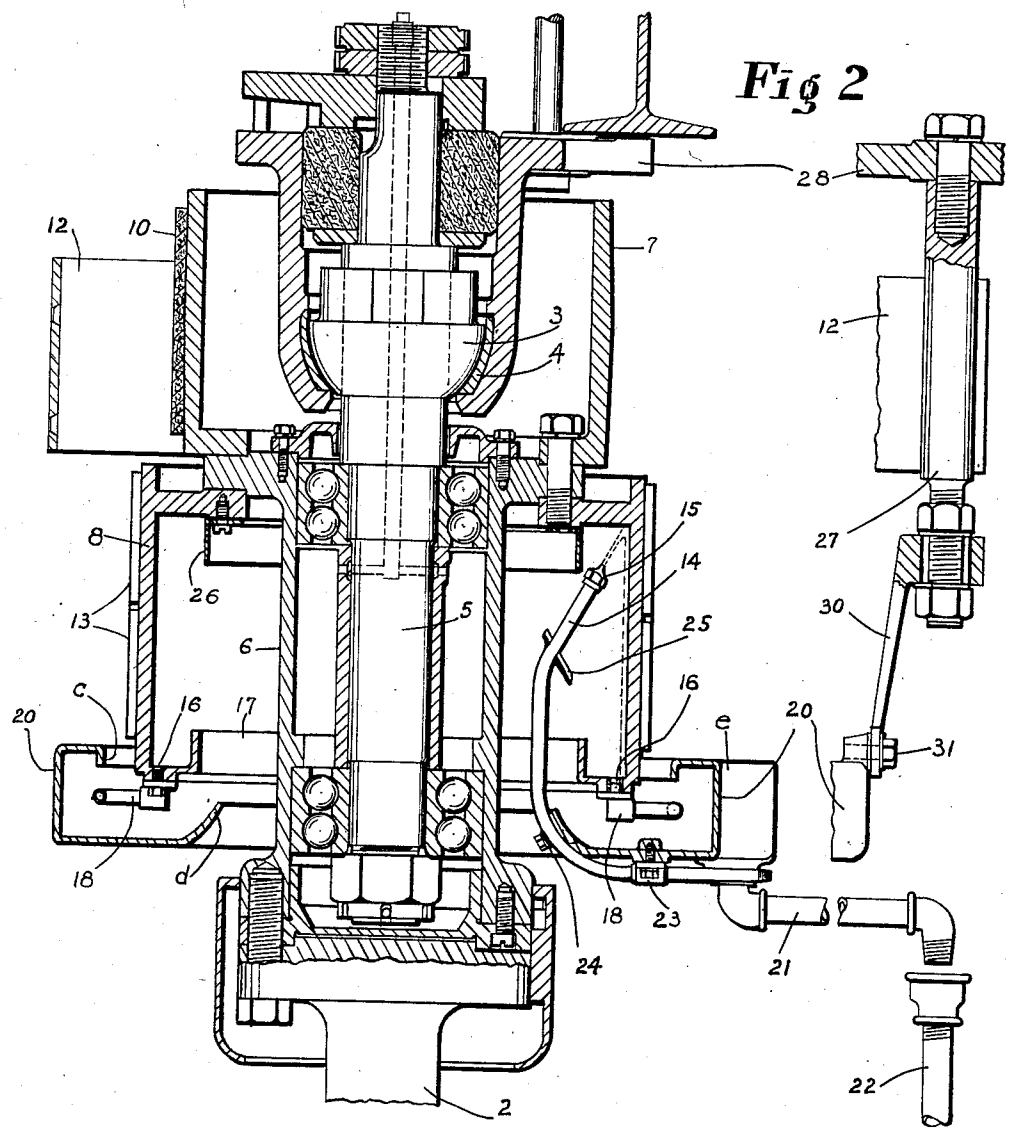


Fig 2

Fig 1

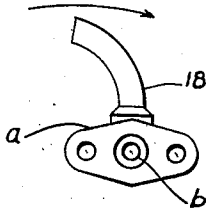


Fig 3

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CENTRIFUGAL SEPARATOR

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The centrifugal separators used in some industries must be stopped at such frequent intervals, or under such conditions, that it is desirable to use some means for cooling the brake drums. Water is a highly effective medium for this purpose, and water cooled brake drums have been used heretofore in centrifugal separators.

The present invention relates to centrifugals so equipped. It aims to improve the brake mechanisms and the water cooling apparatus used with them with a view to producing a construction in which control of the water will be simplified and which will be more nearly automatic in operation than prior constructions of this general type.

In the accompanying drawing, which shows a typical embodiment of the invention:

Figure 1 is a vertical, sectional view of the structure at the head of a suspended type of centrifugal;

Fig. 2 is a view, partly in section and partly in side elevation, of a detail of the construction shown in Fig. 1; and

Fig. 3 is a plan view of one of the discharge nozzles.

The drawing shows the invention as applied to a suspended type of centrifugal, although it will be evident that it is not limited in its application to this particular type. As illustrated, the basket shaft 2, together with the basket which it supports and the load carried thereby, are suspended through ball bearings from the ball joint 3 supported in a stationary socket 4, the member 3 being an integral part of the non-rotary supporting spindle 5. At its upper end the shaft 2 is bolted to a sleeve 6 to which also are bolted the driving pulley 7 and the brake drum 8. The driving belt is indicated at 10, the guard therefor at 12, and the brake bands cooperating with the drum 8 are shown at 13.

All of the parts just referred to may be constructed, arranged and operated in the usual manner, this construction being one well known in the art, except for certain details of the drum 8 which will be referred to later.

The water cooling mechanism provided by this invention comprises a stationary delivery pipe 14 extending up into the interior of the brake drum and equipped with a nozzle 15 arranged to direct a small stream of water against the wall of the drum. The water so discharged spreads over the entire inner circumferential surface of the drum and forms a layer of a thickness determined by the radial position of the outlet openings 16 in the bottom of the drum. At its lower edge this drum is equipped with a flange 17 so connected to the peripheral wall of the drum as to provide a gutter into which the water flows by gravity, and the holes 16 conduct the water from this gutter into discharge nozzles 18—18. As shown in Fig. 3, each of these nozzles comprises a base *a* designed to be bolted to the bottom of the drum 8 and provided with an inlet *b* leading into a curved tube through which the water is discharged. Preferably these nozzles are so placed that they revolve in the direction indicated by the arrow in Fig. 3, the delivery end of each nozzle trailing and thus discharging its water with a minimum tendency to splash. The centrifugal inertia of the water flowing through the nozzles assists the discharging action.

Closely encircling the path of rotation of the nozzles is a stationary casing 20 having top, bottom, and lateral or circumferential walls and cooperating with the drum 8 to approximately enclose said path. The inner margin of the top wall of this casing is bent downwardly to form an annular flange *c*, Fig. 1, while the corresponding margin of the lower wall is bent upwardly, as shown at *d*. Thus this casing collects and confines the water delivered to it. At one side it is provided with an offset portion *e* from the bottom of which pipe connections 21 lead to a waste connection 22.

The supply pipe 14 may conveniently be clamped, or otherwise secured, to the casing 20 at the points 23 and 24. Inside the drum 8 the pipe also has a drip guard 25 secured to it, this member serving to deflect any water running down the pipe into the gutter at the bottom of the drum. Also, in order to assist in controlling the water inside the drum, an annular splash guard 26 is secured to the upper portion thereof in a coaxial relationship to the drum and spaced inwardly from the inner wall thereof, the vertical flange of this drum being so located with reference to the point of delivery of the water as to substantially prevent any splash from striking the sleeve 6 or the parts below it. When the drum is revolving centrifugal force throws the water collected on the guard 26 toward the inner wall of the drum so that it is caught either in the gutter at the bottom of the drum or in the casing 20. Also, when the machine is stationary, any drip from the flange 26 falls on the upper inclined surface of the flange *d* of the casing. In either event the water ultimately is guided into the casing.

While the casing 20 may be supported in any suitable manner, it is conveniently mounted by extending the studs 27, Fig. 2, which support the

belt guard 12. These studs are secured at their upper ends to the frame piece 28, and, as shown, they are provided at their lower ends with threaded extensions supporting hangers 30 to which the casing is secured by bolts, such as that shown at 31.

In using this apparatus it is contemplated that the workman will turn the water on to the pipe 14 when he starts to shut down the machine. Thus it will be delivered continuously and will serve to cool the brake drum while the brake is applied and the machine is being brought to rest. If he neglects to shut the water off at the conclusion of this operation, no harm will be done since the water will merely find its way into the waste pipe 22 in the normal manner, regardless of whether or not the machine is in operation. The operator thus need pay no attention to the water after it has once been turned on until he is through with it. He can then shut it off at his convenience. Thus the apparatus requires a minimum of attention. In addition, it is so located as to be out of the way and it is of such a nature that it adds relatively little to the expense of manufacture of the machine. The water in the drum drains out quickly by gravity when its rotation is stopped.

While I have herein shown and described a typical embodiment of my invention, it will be understood that it can be embodied in other forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. In a centrifugal separator, the combination with a vertical shaft supporting a centrifugal basket for rotary motion about an axis and a brake drum revolving with said shaft, of means external to said shaft for feeding water to the inner surface of said drum to cool the same, said drum being equipped with means for discharging the water therefrom along a predetermined path, and a stationary casing cooperating with said discharging means to collect said water and conduct it to a stationary point of delivery.

2. In a centrifugal separator, the combination with a vertical shaft supporting a centrifugal basket for rotary motion about an axis and a brake drum revolving with said shaft, of means for feeding water to the inner surface of said drum to cool the same, said drum being provided at its lower edge with an internal gutter for catching the water flowing down the inner surface of said drum by gravity and having a discharge outlet leading from said gutter, and a stationary casing encircling the path of revolution of said outlet and provided with top, bottom and lateral walls for receiving and confining the water so discharged.

3. In a centrifugal separator, the combination with a vertical shaft supporting a centrifugal basket for rotary motion about an axis and a brake drum revolving with said shaft, of means for feeding water to the inner surface of said drum to cool the same, said drum being constructed to hold an approximately predetermined radial depth of water under centrifugal action on the inner surface thereof, means at the lower end of said drum and revolving therewith to discharge the water therefrom along a predetermined path, a stationary casing encircling said path and constructed to receive and confine the water so discharged, and means for conducting the water away from said casing.

4. In a centrifugal separator, the combination with a vertical shaft supporting a centrifugal basket for rotary motion about an axis and a brake drum revolving with said shaft, of means for feeding water to the inner surface of said drum to cool the same, said drum being constructed to hold an approximately predetermined radial depth of water under centrifugal action on the inner surface thereof and being equipped with a nozzle for conducting the water away from the inner surface of said drum and discharging it centrifugally, a stationary annular casing in which said nozzle is revolved, said casing having top, bottom and lateral walls, the inner edges of the top and bottom walls being turned downwardly and upwardly, respectively, to provide a gutter in which the discharged water will be confined, and means connected with said casing for conducting the water away from it.

5. In a centrifugal separator according to preceding claim 3, a construction in which said water feeding means includes a water delivery pipe mounted on said casing and extending upwardly into said drum.

6. In a centrifugal separator, the combination with a vertical shaft supporting a centrifugal basket for rotary motion about an axis and a brake drum revolving with said shaft, of means for feeding water to the inner surface of said drum to cool the same, said drum being equipped with means for discharging the water therefrom by gravity, a stationary casing cooperating with said discharging means to collect said water and conduct it to a stationary point of delivery, said drum being provided with an internal annular flange projecting downwardly from the upper portion thereof and spaced inwardly from the inner circumferential wall of the drum, where it cooperates with said wall to control the water delivered into said drum, the lower edge of said flange being so positioned with reference to the parts below it that any drip therefrom, when the drum is stationary, will be caught and directed into said casing.

7. In a centrifugal separator, the combination with a vertical shaft supporting a centrifugal basket for rotary motion about the axis of said shaft and a brake drum revolving with said shaft, of means for feeding water to the inner surface of said drum to cool the same, said drum being provided at its lower edge with an internal gutter for catching the water flowing down the inner surface of said drum by gravity and having a discharge outlet opening from the bottom of said gutter close to the inner surface of the drum, a nozzle secured to said drum and serving to discharge the water from said outlet, said nozzle having an end portion curved into a trailing position with reference to the direction of rotation of the drum, a stationary casing encircling the path of revolution of said nozzle and adapted to receive and confine the water discharged therefrom, and means for conducting water away from said casing.

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