April 22, 1952 B. OFFEN 2,593,595

APPARATUS FOR CHILLING WEBS

Filed April 8, 1948 2 SHEETS—SHEET 1

FIG. 1

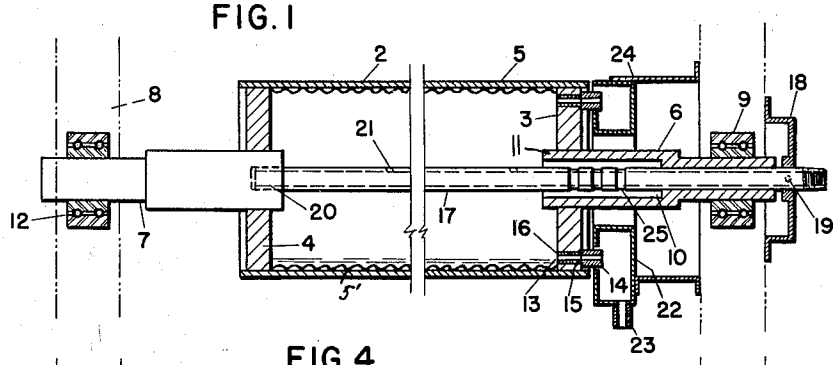


FIG. 4

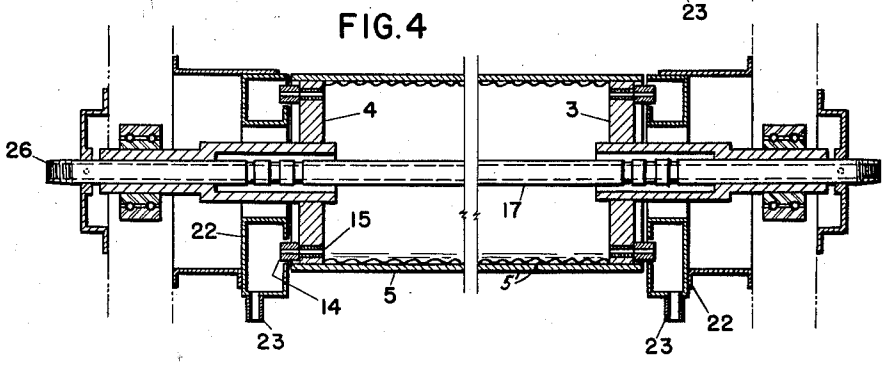


FIG. 3

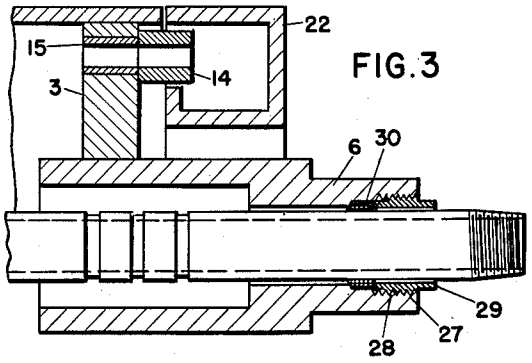
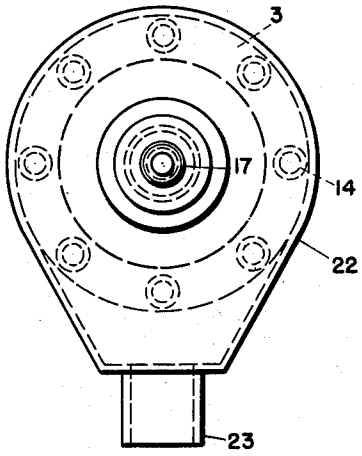


FIG. 2



INVENTOR.

BY Bernard Offen

Hans Seidl

April 22, 1952 B. OFFEN 2,593,595

APPARATUS FOR CHILLING WEBS

Filed April 8, 1948 2 SHEETS—SHEET 2

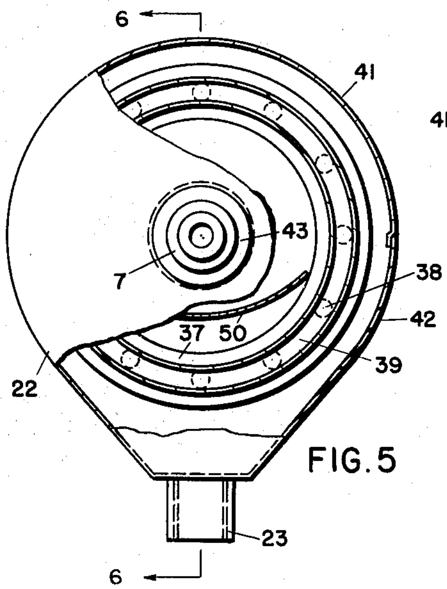


FIG. 5

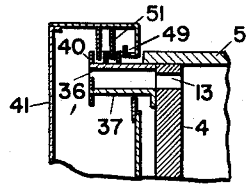


FIG. 7

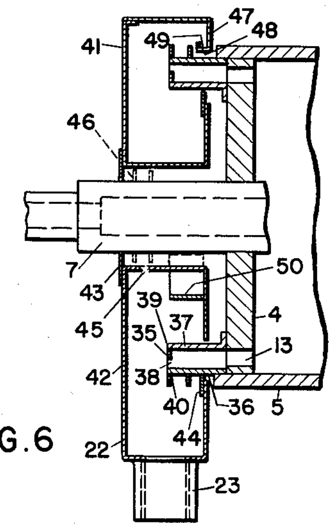


FIG. 6

FIG. 8

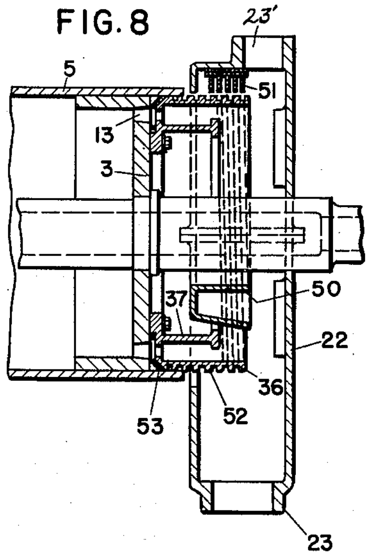


FIG. 9

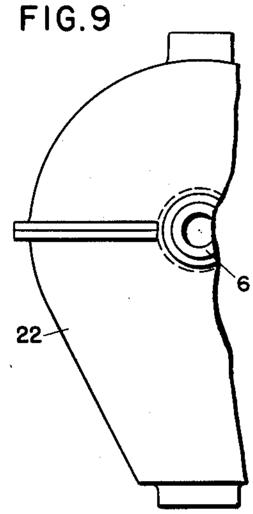
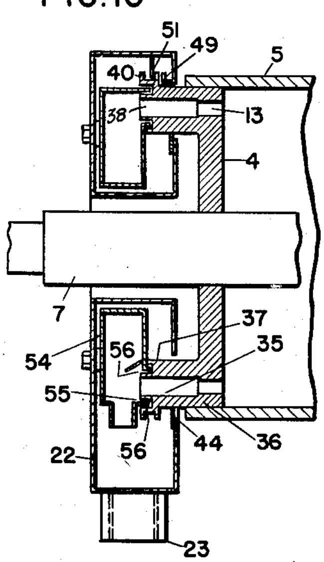


FIG. 10



INVENTOR.

Bernard Offen

BY Herman Seid

Patented Apr. 22, 1952

2,593,595

UNITED STATES PATENT OFFICE

2,593,595

APPARATUS FOR CHILLING WEBS

Bernard Offen, Chicago, Ill.

Application April 8, 1948, Serial No. 19,783

18 Claims. (Cl. 257—95)

1

This application is a continuation-in-part of my application Serial No. 678,519, filed June 21, 1946, now abandoned, and relates to chilling rolls adapted for chilling a web of paper or fabric after such paper or fabric has attained a predetermined temperature.

Heretofore, chilling rolls have consisted of a hollow cylinder having a water inlet and a water outlet, the cylinder being maintained full of water during use. Such rolls are undesirable since the weight of the water is so great that the roll need be driven. In many cases, the chilling roll is disposed at a considerable distance from the driving mechanism which renders such rolls undesirable and expensive in operation. In addition, the entering water mixes with the water in the roll resulting in the entering water being warmed to the temperature of the water in the roll thus preventing adequate cooling of the paper or fabric.

It has also been proposed to construct a double-wall roll structure, the water used for cooling purposes passing between the two walls of the structure. Here again, the weight of the water generally is so great as to require a driven roll while the entering water attains an equilibrium temperature with the water in the roll thus preventing adequate cooling.

The chief object of the present invention is to provide a new and improved chilling roll which need not be connected to driving mechanism of the apparatus and which may be rotated readily at a similar speed by the passage of the web of paper or fabric in contact therewith.

An object of the present invention is to provide a chilling roll containing means for maintaining any desired quantity of water therein, the water being injected with sufficient velocity to create turbulence therein thus assuring that entering water contacts the surface of the roll to be chilled or cooled and assuring a minimum film thickness of water adequate to impart a desired temperature to the surface of the roll.

A further object is to provide a chilling roll containing means for controlling the water level at a desired height or depth thus greatly reducing the quantity of water contained in the roll and obviating necessary connection of the roll to the driving mechanism of the apparatus while permitting the roll to rotate at substantially the speed of the web.

A still further object is to provide a chilling roll containing means for controlling the water level at a desired height or depth in which means are provided to collect water or other liquid continuously removed from the roll and to assure that the discharge water does not return to the roll. Other objects of my invention will be readily perceived from the following description.

2

This invention relates to a chilling roll which comprises a hollow, cylindrical shell, means for supporting the shell, piping for supplying a cooling fluid such as water to cool the exterior cylindrical surface of the shell, and means for controlling the level of fluid within the shell. The controlling means consist of a plurality of openings disposed at spaced intervals about at least one end of the shell, the openings being spaced a desired distance radially from the periphery of the shell to control the level of cooling fluid and to maintain a desired film thickness within the shell.

The attached drawing illustrates a preferred embodiment of my invention in which

Figure 1 is a sectional view of the chilling roll mounted in supports and ready for operation;

Figure 2 is an end elevation of the roll shown in Figure 1 illustrating the drain box;

Figure 3 is a sectional view drawn to exaggerated scale illustrating the means employed for preventing flow of water along the interior piping;

Figure 4 is a sectional view similar to Figure 1 illustrating a modification of my invention;

Figure 5 is an end elevation of a modification of the invention illustrating the construction of the drain box;

Figure 6 is a sectional view taken along the line VI—VI of Figure 5;

Figure 7 is a fragmentary sectional view illustrating baffles employed in connection with slingers shown in Figure 6;

Figure 8 is a sectional view of a further modification;

Figure 9 is an end elevation of the device shown in Figure 8; and

Figure 10 is a sectional view of a further modification of the invention.

Referring to the attached drawing, there is shown a chilling or cooling shell or roll designated generally at 2 for chilling a web of paper or fabric. Roll 2 includes spaced circular end or side walls 3 and 4 connected by a cylindrical wall 5. Spindles 6 and 7 are welded to the end walls 3 and 4 respectively and serve to support roll 2 in the framework 8 of the apparatus. Spindle 6 is hollow, as shown in Figure 1, and is supported in the framework 8 by a suitable bearing member 9 to permit free rotation of the roll in engagement with the web of fabric or paper. Spindle 6 may be provided with a recess 10 for a purpose hereinafter described and may

extend within the interior of roll 2 beyond end wall 3 as shown at 11. Spindle 7, welded to end wall 4, is also journalled in frame work 8 and is supported by bearing member 12 to permit free rotation of roll 2 in the framework.

It is essential in my invention that means be provided for controlling the height or depth of the water in shell 2. For this purpose, at least one end wall, preferably, wall 3 is provided with a plurality of openings 13 drilled at spaced intervals circumferentially of the wall and extending radially a desired distance inwardly from the plane of cylinder 5 to assure a desired depth of film of water being maintained within the roll 2. Nipples or couplings 14, if desired, may be inserted within openings 13. It is desirable to dispose openings 13 as close to the outer edge of wall 3 as is possible in order to assure that the film thickness of the water within the shell 2 is maintained as low as possible. The thickness of the water film in shell 2 is determined, of course, by the distance between the interior surface of cylinder 5 and the nearest point of the openings 13; I have found such distance may be maintained as small as ⅛". Openings 13 may be formed greater in diameter than required; in such case, bushings 15 having openings 16 therein may be secured therein in order to vary within reasonable limits the distance determining the thickness of the water film within roll 2. It will be understood openings 13 or nozzles 14 may be provided on both ends of shell 2 if desired as shown in Figure 4, but generally provision thereof through both end walls is not necessary to assure maintenance of the desired minimum film thickness.

Piping 17 extends through spindle 6 within the interior of roll 2. Piping 17 is secured at one end to the framework 8 by means of a bracket 18 and is provided with a set screw 19 to lock the piping in fixed position. At its opposite end, piping 17 is supported by spindle 7, being mounted in a bearing member 20 to permit free rotation of the spindle and the shell while the piping 17 remains in a stationary position. Piping 17 may be connected to any sutable source of supply (not shown) of cooling water. A plurality of openings 21 are provided at spaced intervals longitudinally of piping 17 to permit discharge of cooling water into the interior of the shell 2. Preferably, the openings 21 are drilled in the wall of piping 17 at a 30° angle to a line drawn perpendicularly thereof. If desired, piping 17 may be provided with suitable nozzles for the discharge of water into the interior of the shell. It is essential in my invention that water discharged through openings 21 be discharged at sufficient velocity to impinge against the interior surface of cylindrical wall 5. Impingement of water against cylinder 5 creates sufficient turbulence of the water to assure that the cool water contacts and cools the interior surface of cylinder 5. If desired, turbolator 5' may be disposed adjacent the interior surface of wall 5. Turbolator 5' may consist of expanded metal, screening, or other suitable material. It serves to provide additional friction to such surface and as a mechanical means for carrying water around the interior of the roll. It assures that water does not remain in a stagnant condition adjacent such surface and permits more efficient heat transfer for it agitates water adjacent the surface of wall 5.

A drain box 22 in the form of an annulus-like member is disposed adjacent side wall 3 of roll 2;

excess water may flow from roll 2 through nozzles or nipples 14 into drain box 22. Excess water collects in the bottom of drain box 22 by gravity and may be withdrawn therefrom to any suitable waste through pipe 23. It will be understood drain box 22 may be mounted by any suitable means such as bracket 24 on the framework 8 of the apparatus. Drain box 22 remains in fixed position and does not rotate with roll 2.

As shell 2 rotates, some minor amount of water may flow through the opening where piping 17 enters shell 2. To prevent any substantial amount of water flowing through such opening, spindle 6 is extended as shown at 11 thereby preventing any substantial quantity of water, which might have a tendency to rise during rotation of roll 2, from flowing through such opening. A plurality of U-shaped grooves 25 may be formed at spaced intervals in piping 17 as shown in Figures 1 and 3; if water has a tendency to flow or creep along such piping, it is collected by grooves 25 and forced to drain into recess 10 in spindle 6; recess 10 opens into the interior of shell 2 and assures that all water collected therein drains into the interior of roll 2.

While I have shown in Figure 1 that piping 17 is secured at one end in a self-lubricating bearing 20, it will be understood that such construction is not essential to the present invention. As shown in Figure 4, the piping 17 may be extended through side or end wall 4, supported in framework 8, and closed with a suitable cap or plug 26. Similar means may be employed at both ends of piping 17 to mount the piping in fixed position within the shell 2.

If desired, as shown in Figure 3, to assure that seepage of water does not occur between piping 17 and spindle 6, spindle 6 may be provided with threads 27 adapted to engage and cooperate with similar threads 28 of a gland 29. Suitable packing material 30 may be disposed between spindle 6 and gland 29 and compressed in place to form a secure seal between such members.

As described above, the film thickness of cooling water within shell or roll 2 is regulated or controlled by means of openings 13 and nozzles 14 if desired, thus assuring minimum film thickness and continuous and adequate flow of water through the interior of roll 2 to maintain the surface 5 of the roll at a desired temperature. The openings or nozzles 21 in piping 17 are so formed as to assure discharge of the cooling water at high pressure; the velocity of discharge is such that the water impinges against the internal surface of cylinder 5 and forces the thin water film away from the wall thus assuring entering water coming in contact with and adequate cooling of such surface. The centrifugal force of the water, as the chilling roll rotates, flings or throws the water toward the outer surface; due to pressure of discharge of water entering the interior of the shell, the water in the shell flows through the openings in the end wall.

By properly controlling the water level in the chilling roll, the amount of water necessary to cool the roll may be greatly decreased. By using only a small quantity of water, the water may be discharged directly against the surface to be cooled, thus assuring a roll surface temperature comparative to the temperature of the entering water since the entering water does not mix to any great extent with the water in the roll. An advantage of the chilling roll of my invention resides in the elimination of the necessity for driving such roll. This is important for

the roll frequently is placed in a position remote from the driving mechanism which renders it highly expensive to drive the roll.

The elimination of driving mechanism for the chilling roll permits the roll to be rotated at web speed thereby eliminating the difficulties involved in attempting to synchronize the speed of a driven roll with the speed of the web. Such problem is eliminated in my invention for the roll is driven directly by the web.

In Figures 5 and 6, I have disclosed a modified means of collecting discharged water. In the structure shown, an annular member **35** is provided forming a continuous channel or gutter extending circumferentially about the end wall and serving to collect water discharged through the openings **13** in end wall **4** of roll **2**. Member **35** is formed of elements **36** and **37**, preferably attached to end wall **4** and to cylindrical wall **5** so as to rotate with roll **2**. Element **36** is spaced from element **37** to form a channel therebetween. Openings **38** are formed in the radially extending wall **39** of member **35** to permit water from the channel to pass into drain box **22**. Slingers **40** are formed in element **36** so that water running out through openings **38** will be thrown against the casing of drain box **22**.

It will be noted in this form of my invention, drain box **22** is formed of an upper section **41** and a lower section **42**, upper section **41** fitting within lower section **42** as best shown in Figure 5. The sections **41** and **42** are spaced from spindle **7**, a split ring gasket **43** being disposed about spindle **7** and serving to close the space between the spindle and the sections. It will be noted sections **41** and **42** are also spaced from annular member **35**; a second split ring gasket **44** disposed about member **35** serves to close such space.

Condensation of moisture or leakage may occur within the space formed by spindle **7** and box **22** which is closed or sealed by gasket **43**. To permit moisture condensing in such space to be removed, weep holes **45** may be formed in the upper wall of section **42** thus permitting moisture in such space to drain into section **42**. If desired, baffles **46** may be disposed about spindle **7** to prevent movement of such moisture toward the outer extremity of the spindle and to direct such moisture toward the weep holes.

The inner wall **47** of section **41** is provided with an inwardly and upwardly extending flange **48** forming a channel **49** to collect water and to permit collected water to run down the sides of section **41** into section **42**.

A drip baffle or splash trough **50** is provided in section **42** of drain box **22**. Baffle **50** serves to stop the flow of water from section **41** and to direct such water so it will spray or splash beyond the lower outlets. If desired, baffles **51** (shown in Figure 7) may be provided extending from section **41** of box **22** between adjacent slingers **40**. These baffles prevent creep of water along section **41** and force the water through section **41** to drain into section **42** where it may be removed through drain **23**.

In Figures 8 and 9, I have illustrated a further modification of the invention. In this case, member **36** extends longitudinally beyond member **37** and is provided on its exterior surface with a spiral thread **52** which serves to carry water away from the chilling roll **2**. If any water tends to creep back toward roll **2** on member **35**, spiral thread **52** will assure such water being carried toward the outlet and thus assure discharge of the water into the drain box. A gasket **53** is placed between member **36** and end wall **3** to seal the space therebetween. It will be noted an opening **23'** is provided at the top of casing **22**. Opening **23'** may be employed for vapor relief, permitting attachment of an exhaust system or a vacuum system to box or casing **22** if necessary. In other respects, this structure is similar to those described above.

Figure 10 illustrates another modification. In this modified form of my invention, a casing **54** is provided adapted to receive water from the openings **38** of annular member **35**. Casing **54** remains stationary during rotation of roll **2** and preferably is attached to drain box **22** by any suitable means as shown. Casing **54** is provided with flanges **55** fitting within recesses **56** in elements **36** and **37**, which form annular member **35**. Drain box **22** encloses casing **54**. Water is trapped in casing **54** and drain box **22** serves to take care of vapor liberated due to water agitation. No stuffing glands need be used in this structure since the water is trapped effectively by the inner casing **54**.

It will be understood annular member **35** in the structures illustrated may comprise separate elements bolted or welded to the end wall and cylindrical wall of the shell or may be formed integral with the end wall as desired.

While I have described and illustrated a preferred embodiment of my invention, it will be understood my invention is not limited thereto since it may be otherwise embodied within the scope of the following claims.

I claim:

1. In apparatus of the character described, the combination of a cylindrical hollow shell, said shell including spaced circular end walls, a cylindrical wall connecting the end walls, spindles extending from the end walls adapted to be rotatably supported in the framework of the apparatus, at least one of said spindles being hollow and having a recess therein, piping extending through said hollow spindle and into the interior of the shell to supply fluid to cool the shell, means for securing the piping in fixed position, at least one end wall of the shell having a plurality of spaced openings extending therethrough, nozzles adjacent said openings, the openings being spaced a predetermined distance radially inward from the cylindrical wall to control the level of fluid within the shell, said piping having a plurality of U-shaped grooves extending about its exterior surface adjacent the spindle recess, said grooves serving to collect fluid to permit the collected fluid to drip into the spindle recess and to return to the interior of the shell, and an annular drain box disposed at one end of the shell through which the piping and a spindle passes, said drain box enclosing the nozzles and serving to receive cooling fluid draining through the nozzles.

2. In apparatus of the character described, a rotatable hollow, cylindrical shell, said shell including spaced circular end walls and a cylindrical wall connecting the end walls, spindles extending from the end walls adapted to be supported in the framework of the apparatus, at least one of said spindles being hollow, piping extending through the hollow spindle within the interior of the shell, said piping having a plurality of spaced openings therein through which medium is supplied to cool the exterior cylindrical surface of the shell, fluid being discharged through said openings at a velocity sufficiently great to impinge the fluid against the interior surface of the cylindrical wall, at

least one end wall of the shell having a plurality of spaced openings extending therethrough whereby the level of cooling fluid within the shell may be regulated, rotation of the roll by movement thereover of material to be cooled creating centrifugal forces to force liquid through the openings, water draining through all the openings substantially simultaneously when the roll is rotated, one of said spindles having a recess formed in its interior surface adapted to collect medium dripping from the exterior of the piping and to return such medium to the interior of the shell, said spindle extending within the interior of the shell a sufficient distance beyond the end wall to prevent any substantial quantity of fluid from flowing between the piping and the spindle, said piping having a plurality of U-shaped grooves therein adjacent the spindle recess whereby fluid collecting in the grooves may drop into the spindle recess, and an annular drain box disposed at one end of the shell enclosing the end wall openings and serving to receive medium passing through the openings.

3. In apparatus of the character described, a rotatable hollow, cylindrical shell, said shell including spaced circular end walls and a cylindrical wall connecting the end walls, a hollow spindle extending from one end wall adapted to be supported in the framework of the apparatus, a second spindle extending from the opposite wall of the apparatus, and within the interior of the shell, piping extending through the hollow spindle within the interior of the shell and being supported by the second spindle, a bearing member disposed between the piping and the second spindle to permit free rotation of the second spindle while holding the piping in fixed position, said piping having a plurality of spaced openings therein through which medium is supplied to cool the exterior cylindrical surface of the shell, fluid being discharged through said openings at a velocity sufficiently great to impinge the fluid against the interior surface of the cylindrical wall, means for controlling the level of cooling fluid within the shell, said means including a plurality of spaced removable members placed in openings in at least one end wall having openings therein spaced predetermined distance from the periphery of the shell, rotation of the roll by movement thereover of material to be cooled creating centrifugal forces to force liquid through the openings, water draining through all the openings substantially simultaneously when the roll is rotated, one of said spindles having a recess formed in its interior surface adapted to collect fluid dripping from the exterior of the piping and to return such fluid to the interior of the shell, said spindle extending within the interior of the shell a sufficient distance beyond the end wall to prevent any substantial quantity of fluid from flowing between the piping and the spindle, said piping having a plurality of U-shaped grooves therein adjacent the spindle recess whereby fluid collecting in the grooves may drop into the spindle recess, and an annular drain box disposed at one end of the shell enclosing the controlling means and serving to receive fluid passing through the controlling means.

4. In a chilling roll of the character described, the combination of a rotatable, cylindrical, hollow shell including spaced circular end walls, a cylindrical wall connecting the end walls, spindles extending from the end wall to support the shell in rotatable position, means for supplying cooling fluid to the shell, said shell having openings in at least one end wall spaced a desired distance radially from the cylindrical wall of the shell to maintain a desired level of cooling fluid within the shell, a rotatable, annular member extending about the end wall to receive liquid discharged through said openings and forming a channel for the reception of discharged liquid, a stationary drain box, said annular member having spaced openings in its radially extending wall through which the liquid passes into the drain box, rotation of the roll by movement thereover of material to be cooled creating centrifugal forces to force liquid through the openings, water draining through all the openings substantially simultaneously when the roll is rotated, the drain box including a lower element, an upper element fitting into the lower element, said elements being spaced from the spindle of the shell, a ring gasket closing the opening between the spindle and said elements, the walls of the drain box elements being spaced radially from the annular member, and a second ring gasket closing the space between the annular member and the drain box elements.

5. A chilling roll according to claim 4, in which the inner wall of the upper element extends downward and a flange extends inward and upward therefrom to form a channel to direct liquid toward the lower element.

6. A chilling roll according to claim 4 in which a baffle is disposed in the lower element to receive liquid from the upper element.

7. In a chilling roll of the character described, the combination of a rotatable, cylindrical, hollow shell including spaced circular end walls, a cylindrical wall connecting the end walls, means for supplying cooling liquid to the shell, said shell having openings in at least one end wall spaced a desired distance radially from the cylindrical wall of the shell to maintain a desired level of cooling liquid within the shell, a rotatable, annular member extending about the end wall to receive liquid discharged through said openings and forming a channel for the reception of discharged liquid, an inner casing forming a drain box, said annular member having openings through which the discharged liquid passes into the drain box, and an outer casing disposed about the inner casing to retain vapor released by the agitation of the liquid.

8. A chilling roll according to claim 7 in which the annular member is formed integral with the end wall of the shell.

9. A chilling roll according to claim 7 in which flanges of the inner casing fit within recesses in the annular member.

10. In a chilling roll of the character described, the combination of a rotatable, cylindrical, hollow shell including spaced circular end walls, a cylindrical wall connecting the end walls, means for supplying cooling liquid to the shell, said shell having openings in at least one end wall spaced a desired distance radially from the cylindrical wall of the shell to maintain a desired level of cooling liquid within the shell, a rotatable, annular member extending about the end wall to receive liquid discharged through the openings and forming a channel for the reception of discharged liquid, recesses in said annular member, an inner casing forming a drain box, said casing having flanges fitting within the recesses, said annular member having openings through which discharged liquid passes into the drain box, an outer casing disposed about the inner casing and spaced therefrom, slingers on said annular member, said outer

casing having a baffle extending therefrom between adjacent slingers, the outer casing being spaced from the annular member, and a ring gasket closing the space between the annular member and the outer casing.

11. In a chilling roll of the character described, the combination of a rotatable, cylindrical, hollow shell including spaced circular end walls, a cylindrical wall connecting the end walls, means for supplying cooling fluid to the shell, said shell having openings in at least one end wall spaced a desired distance radially from the cylindrical wall of the shell to maintain a desired level of cooling fluid within the shell, a rotatable, annular member extending about the end wall to receive liquid discharged through said openings and forming a channel for the reception of discharged liquid, and a drain box, said annular member having spaced openings in its radially extending wall through which the liquid passes into the drain box, said annular member having a spiral thread on its exterior surface to prevent movement of liquid toward the shell.

12. A chilling roll according to claim 11 in which the annular member includes an inner ring, and an outer ring carrying the spiral thread on its exterior surface, the outer ring extending longitudinally beyond the inner ring.

13. In a chilling roll of the character described, the combination of a rotatable, cylindrical, hollow shell including spaced circular end walls, a cylindrical wall connecting the end walls, means for supplying cooling fluid to the shell, said shell having openings in at least one end wall spaced a desired distance radially from the cylindrical wall of the shell to maintain a desired level of cooling fluid within the shell, a rotatable, annular member extending about the end wall to receive liquid discharged through said openings and forming a channel for the reception of discharged liquid, and a drain box, said annular member having spaced openings in its radially extending wall through which the liquid passes into the drain box, said annular member having a spiral thread on its exterior surface to prevent movement of liquid toward the shell, said annular member comprising an inner ring adjacent the end wall of the shell, an outer ring spaced from the inner ring and adjacent the cylindrical wall of the shell, a gasket disposed between the outer ring and the end wall of the shell, said outer ring extending longitudinally beyond the inner ring, said drain box having baffles disposed in its upper portion adjacent the outer ring member.

14. In apparatus of the character described, a hollow, cylindrical shell, said shell including spaced circular end walls and a cylindrical wall connecting the end walls, spindles extending from the end walls adapted to be supported in the framework of the apparatus, bearings being disposed between the spindles and the framework to permit free rotation of the shell, at least one of said spindles being hollow, piping extending through the hollow spindle within the interior of the shell, means to secure the piping in fixed position without interference with the rotation of the shell, said piping having a plurality of spaced openings therein through which medium is supplied to cool the exterior cylindrical surface of the shell, fluid being discharged through said openings at a velocity sufficiently great to impinge the fluid against the interior surface of the cylindrical wall, at least one end wall of the shell having a plurality of spaced openings extending therethrough whereby the level of cooling fluid within the shell may be regulated, rotation of the roll by movement thereover of material to be cooled creating centrifugal forces to force liquid through the openings, water draining through all the openings substantially simultaneously when the roll is rotated, said hollow spindle having a recess formed in its interior surface to collect medium dripping from the exterior of the piping in the spindle and to return such medium to the interior of the shell, said spindle extending within the interior of the shell a sufficient distance beyond the end wall to prevent any substantial quantity of fluid from flowing between the piping and the spindle, said piping having a plurality of U-shaped grooves therein adjacent the spindle recess whereby fluid collecting in the grooves may drop into the spindle recess, and an annular drain box disposed at one end of the shell to receive medium passing through the openings.

15. Apparatus according to claim 14 in which the openings in the piping are disposed at a 30° angle to a line drawn perpendicularly of the piping.

16. Apparatus according to claim 15 in which the piping is provided with threads, a gland is adapted to engage the threads of the piping, and packing material is compressed between the gland and the interior of the hollow spindle to seal the space between the piping and the interior wall of the spindle.

17. In a chilling roll of the character described, the combination of a rotatable, cylindrical, hollow shell including spaced circular end walls, a cylindrical wall connecting the end walls, means for supplying cooling liquid to the shell, said shell having openings in at least one end wall spaced a predetermined distance radially from the cylindrical wall of the shell to maintain a desired level of cooling liquid within the shell, rotation of the roll by movement thereover of material to be cooled creating centrifugal forces to force liquid through the openings, liquid draining through all the openings substantially simultaneously when the roll is rotated, a rotatable, annular member extending about the end wall to receive liquid discharged through said openings and forming a channel for the reception of discharged liquid, a stationary drain box enclosing the annular member, said annular member having spaced openings in its radially extending wall through which the liquid passes into the drain box, and slingers placed on said annular member serving to sling liquid passing through the openings therein toward the wall of the drain box.

18. A chilling roll according to claim 17 in which at least one stationary baffle extends from the wall of the drain box between adjacent slingers to prevent creep of liquid along the wall of the drain box.

BERNARD OFFEN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,259,837	Collins	Mar. 19, 1918
1,531,940	Hoeflich	Mar. 31, 1925
1,575,249	Berry et al.	Mar. 2, 1926
1,768,156	Schroder	June 24, 1930
1,819,988	Jones	Aug. 18, 1931
1,994,360	Hurxthal	Mar. 12, 1935
2,160,778	Dall et al.	May 30, 1939
2,293,982	Jackson	Aug. 25, 1942