

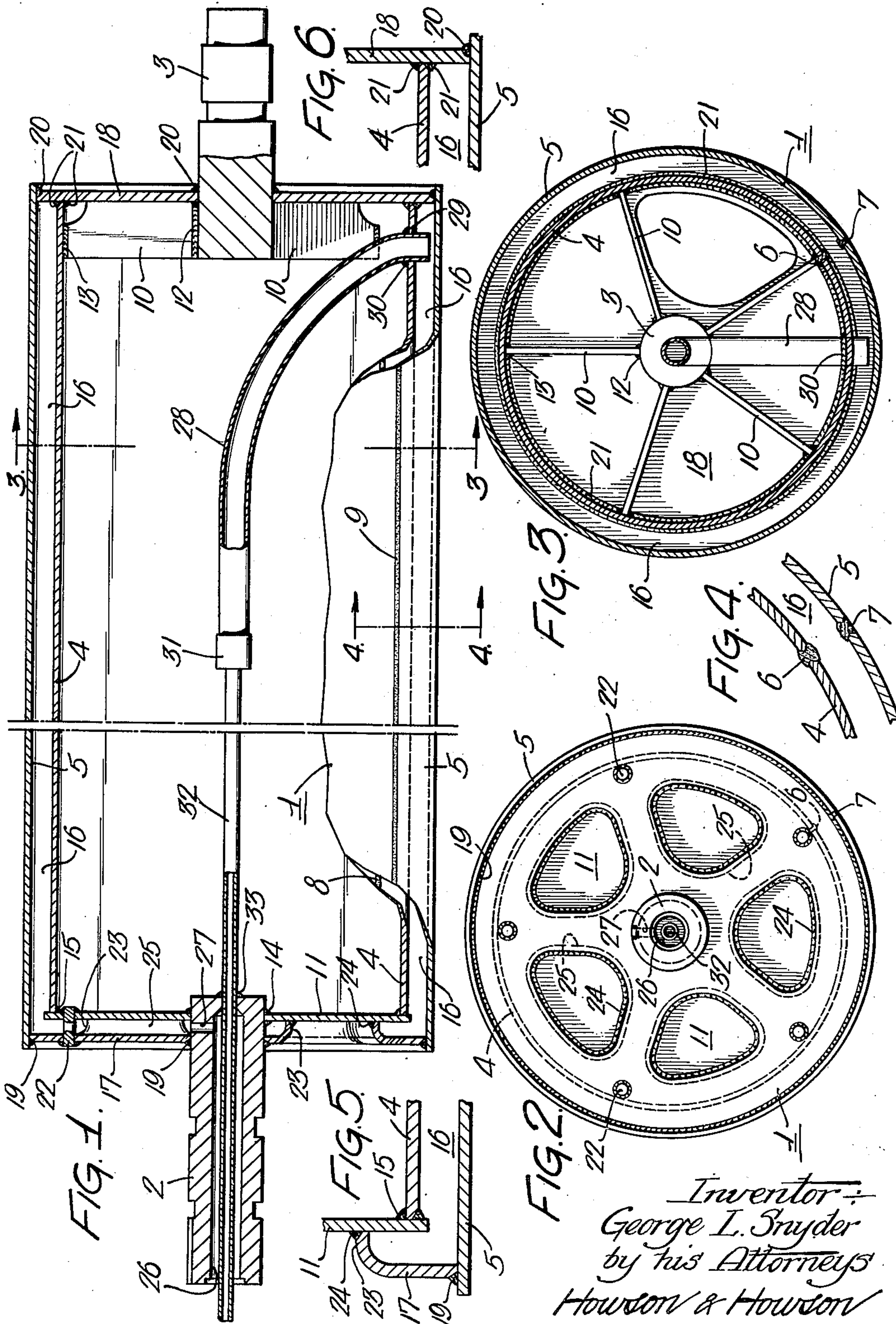
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ROLL

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ROLL

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This invention relates to new and useful improvements in rolls and more particularly to rolls of the type adapted to be heated or cooled by the introduction of heating or cooling fluids thereto.

Rolls of the type described are utilized extensively in the paper, textile and rubber industries as well as in many other industries. These rolls usually are hollow and in many instances are provided with a circumferentially extending fluid chamber at the periphery which serves to concentrate the heating or cooling fluid at the surface of roll so that the desired temperature of the outer shell is obtained most effectively and economically. Such rolls also necessarily have associated therewith suitable means for introducing into the peripheral chamber of the roll and for removing or withdrawing therefrom the selected heating or cooling fluid.

With this in mind, one object of the present invention is to provide a roll of the type described which embodies novel features of construction and arrangement of parts.

Another object of the present invention is to provide a roll of the character set forth embodying novel features of construction and arrangement for supplying heating or cooling fluid to the peripheral chamber of the roll.

Another object of the invention is to provide a roll of the described character having a novel construction and arrangement of parts for removing fluids and entrapped air from the peripheral chamber of the roll.

A further object of the present invention is to provide a novel roll having the described features of construction and arrangement which is fabricated of sheet metal stock secured and joined together by means of welding.

A still further object of the invention is to provide a roll having the structural features and characteristics set forth which is of a highly durable yet simplified construction, which is capable of being fabricated relatively inexpensively by production methods and which is highly effective and efficient in operation and use.

These and other objects of the invention, and the various features and details of the construction and operation thereof, are hereinafter fully set forth and described with reference to the accompanying drawing, in which:

Fig. 1 is a longitudinal sectional view through a roll made according to the present invention.

Fig. 2 is an elevational view of one end of the roll.

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Fig. 3 is a sectional view taken on line 3—3, Fig. 1.

Fig. 4 is an enlarged fragmentary sectional view taken on line 4—4, Fig. 1.

Fig. 5 is an enlarged fragmentary sectional view of the construction illustrated at the lower left hand corner of Fig. 1; and

Fig. 6 is a view similar to Fig. 5 of the construction illustrated at the lower right hand corner of Fig. 1.

Referring now more particularly to the drawing, reference numeral 1 generally designates a roll or drum made in accordance with and embodying the present invention. As shown in Fig. 1 the roll 1 comprises the usual trunnions 2 and 3 arranged coaxially at opposite ends of the roll to support the same for rotation in the usual manner. The circumferential wall structure of the roll or drum 1 comprises inner and outer cylindrical shells 4 and 5, respectively, which are fabricated of sheet metal stock of desired gauge that is rolled to cylindrical shape with their respective edges in abutting relation and secured together in fluid-tight relation, for example, by welding as indicated at 6 and 7 in Fig. 4 of the drawing, forming seams 8 and 9 longitudinally of the roll 1.

The inner shell 4 is supported concentrically with respect to the rotational axis of the roll 1 at one end by means of an end plate 10 to which it is welded as at 21 and by a plurality of radially extending ribs or the like 11 and at the other end by means of an annular plate or similar member 11. With reference more particularly to Fig. 3 of the drawing, the ribs 10 are arranged in spoke-like fashion at equally spaced intervals circumferentially of the trunnion 3 and are permanently secured to the latter and to the interior wall of the shell 4, for example, by welding as indicated at 12 and 13, respectively. On the other hand, the plate 11, which provides a solid end wall, is mounted upon the inner end of the trunnion 2 and has its peripheral edge portion disposed in endwise engagement with the shell 4, the said plate 11 being permanently secured in fluid-tight relation to the trunnion 2 and to the shell 4, for example, by welding as indicated at 14 and 15, respectively.

As shown in the drawing, the outer shell 5 is of greater diameter and greater axial length than the inner shell 4 and is adapted to be supported concentrically with respect to the rotational axis of the roll 1 in relatively spaced relation to the inner shell 4 so as to provide a circumferentially extending peripheral chamber 16 between the

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inner and outer shells 4 and 5. The outer shell 5 is supported in the described relation to the inner shell 4 by means of the end plate 18 and an end plate 17 which have their inner edges secured respectively to the trunnions 2 and 3 and their peripheral edges secured to the interior surface of the outer shell 5, for example, by means of welding as indicated at 19 and 20, respectively, in Fig. 1.

It is to be noted that the end plate 18 is positioned axially of the roll so as to engage against the adjacent end edge of the inner shell 4 (see Fig. 6) to which it is secured in fluid-tight relation, for example, by welding as indicated at 21. On the other hand, it is to be noted that the other end plate 17 is axially spaced endwise from the inner shell end plate 11 and is supported relative thereto by a plurality of studs 22 secured therebetween at preselected equally spaced intervals circumferentially of the roll to provide the required strength and rigidity to the structure.

In accordance with the present invention the outer shell end plate 17 is provided with a plurality of inwardly extending pressed-out continuous flange portions 23 arranged at equally spaced intervals circumferentially of the roll and these continuous flange portions 23 are formed so that their edges engage against or abut the outer face of the adjacent inner end plate 11 to which they are permanently secured in fluid-tight relation, for example, by welding as indicated at 24, to thereby form between the inner and outer end plates 11 and 17 a plurality of closed passages 25 that extend from the trunnion 2 radially outward to the peripheral chamber 16 provided between the inner and outer shells 4 and 5 as previously described. The passages 25 are arranged circumferentially of the roll as shown in Fig. 2 and, as shown in Fig. 1, the trunnion 2 of the roll is provided with an axial bore or passage 26 for steam or other heating or cooling fluid which flows through one or more radial ports 27 in said trunnion and then through the desired radial passages 25 to the peripheral chamber 16 for heating or cooling the outer shell 5 of the roll as the case may be.

For the purpose of removing fluid such as steam condensate from the roll member 16, the present invention contemplates the provision of an arcuate pipe 28 having one end thereof opening interiorly of the peripheral roll chamber 16 through an opening 29 formed in the inner shell 4 adjacent the end of the roll remote from the fluid inlet thereto and to which the end portion of said pipe 28 is permanently secured, for example, by welding as indicated at 30. The other end of the arcuate pipe or conduit 28 is connected by means of a coupling 31 to the inner end of a relatively smaller tube 32 which extends coaxially inwardly of the roll through the trunnion 2 and its fluid inlet passage 26, for example, in the manner and relation shown in Fig. 1 of the drawing. The tube 32 is secured by welding or other means 33 to the journal 2 to prevent loss of pressure or fluid into the inner roll chamber.

By this construction and arrangement, it will be observed that the tube 28 will rotate with the roll or drum and, accordingly, during successive revolutions of the latter, will be disposed alternately to remove fluids collecting in the lower portion of the roll chamber 16 and to remove air collecting in the upper portion of the roll chamber 16, this latter being particularly advantageous since it precludes the otherwise frequent occur-

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rence of air becoming trapped in the roll chamber. This construction also provides an arrangement which is effective and operable to remove fluids collecting in the roll chamber at both above and below critical speeds of the roll.

From the foregoing description it will be observed that the present invention provides a roll of the character set forth which embodies novel features of construction and arrangement of parts. The invention also provides a roll of the type described which embodies novel features of construction and arrangement for supplying heating or cooling fluids to the peripheral chamber of the roll and for removing fluids and entrapped air therefrom. The invention is further characterized by the fact that a roll made in accordance herewith may be fabricated of sheet metal stock secured and joined together in fluid-tight relation by means of welding. Finally, the invention provides a roll having the structural features and characteristics set forth which is of a highly durable yet simplified construction capable of being fabricated relatively inexpensively by production methods and which is highly effective and efficient in operation and use.

While a particular embodiment of the present invention has been illustrated and described herein, it is not intended that the invention be limited to such disclosure and changes and modifications may be made therein and thereto within the scope of the following claims.

I claim:

1. A roll comprising inner and outer relatively spaced shells defining therebetween a peripheral fluid chamber, a single end plate at one end of the roll having its peripheral portion secured in fluid-tight relation to the adjacent end portions of said inner and outer shells, a trunnion for said one end of the roll secured to said single end plate coaxially of the roll, a plurality of radially extending ribs secured intermediate said trunnion and inner shell in supporting relation to the latter, an inner end plate at the other end of the roll having its peripheral portion secured in fluid-tight relation to the adjacent end of said inner shell, an outer plate arranged in endwise spaced relation to said inner end plate and having its peripheral portion secured in fluid-tight relation to the adjacent end of said outer shell, one of said inner and outer plates having continuous pressed-out flange portions engaging against and secured in fluid-tight relation to said other plate to form therebetween a plurality of circumferentially arranged radially extending fluid passages communicating at their outer ends with the interior of said peripheral chamber, and a second trunnion for said other end of the roll secured in fluid-tight relation to said inner and outer end plates coaxially of the roll, said second trunnion having a fluid passage coaxially therein and at least one port communicating outwardly from said trunnion passage to the inner ends of said radially extending passages.

2. A roll comprising inner and outer relatively spaced shells defining therebetween a peripheral fluid chamber, a single end plate at one end of the roll having its peripheral portion secured in fluid-tight relation to the adjacent end portions of said inner and outer shells, a trunnion for said one end of the roll secured to said single end plate coaxially of the roll, a plurality of radially extending ribs secured intermediate said trunnion and inner shell in supporting relation to the latter, an inner end plate at the other end of the roll having its peripheral portion secured

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in fluid-tight relation to the adjacent end of said inner shell, an outer plate arranged in endwise spaced relation to said inner end plate and having its peripheral portion secured in fluid-tight relation to the adjacent end of said outer shell, one of said inner and outer plates having continuous pressed-out flange portions arranged with the edges of said flanges engaging against and secured in fluid-tight relation to said other plate to form therebetween a plurality of circumferentially arranged radially extending fluid passages communicating at their outer ends with the interior of said peripheral chamber, a second trunnion for said other end of the roll secured in fluid-tight relation to said inner and outer end plates coaxially of the roll, said second trunnion having a fluid passage coaxially therein and at least one port communicating outwardly from said trunnion passage to the inner ends of said radially extending passages, an arcuate pipe rotatable with said roll interiorly thereof and having one end thereof opening interiorly of the peripheral chamber through said inner shell and its other end extending substantially axially of the roll, and a tube connected to said other end of the fluid pipe and extending coaxially of the roll outwardly through one of said trunnions.

3. A roll comprising inner and outer relatively spaced sheet metal shells defining therebetween a peripheral fluid chamber, a single sheet metal end plate at one end of the roll having its peripheral portion welded in fluid-tight relation to the adjacent end portions of said inner and outer shells, a trunnion for said one end of the roll welded to said single end plate coaxially of the roll, a plurality of radially extending ribs welded intermediate said trunnion and inner shell in supporting relation to the latter, an inner sheet metal end plate at the other end of the roll having its peripheral portion welded in fluid-tight relation to the adjacent end of said inner shell, an outer sheet metal plate arranged in endwise spaced relation to said inner end plate and having its peripheral portion welded in fluid-tight relation to the adjacent end of said outer shell, a plurality of inwardly extending continuous flange portions pressed-out from said outer end plate and arranged with the edges of said flanges engaging against and welded in fluid-tight relation to said inner end plate to form a plurality of circumferentially arranged radially extending fluid passages communicating at their outer ends with the interior of said peripheral chamber, and a second trunnion for said other end of the roll secured in fluid-tight relation to said inner and outer end plates coaxially of the roll, said second trunnion having a fluid passage coaxially therein and at least one radial port communicating outwardly from said trunnion passage to the inner ends of said radially extending passages.

4. A roll comprising inner and outer relatively spaced sheet metal shells defining therebetween a peripheral fluid chamber, a single sheet metal end plate at one end of the roll having its peripheral portion welded in fluid-tight relation to the adjacent end portions of said inner and outer shells, a trunnion for said one end of the roll welded to said single end plate coaxially of the roll, a plurality of radially extending ribs welded intermediate said trunnion and inner shell in supporting relation to the latter, an in-

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ner sheet metal end plate at the other end of the roll having its peripheral portion welded in fluid-tight relation to the adjacent end of said inner shell, an outer sheet metal plate arranged in endwise spaced relation to said inner end plate and having its peripheral portion welded in fluid-tight relation to the adjacent end of said outer shell, a plurality of inwardly extending continuous flange portions pressed out from said outer end plate and arranged with the edges of said flanges engaging against and welded in fluid-tight relation to said inner end plate to form a plurality of circumferentially arranged radially extending fluid passages communicating at their outer ends with the interior of said peripheral chamber, a second trunnion for said other end of the roll welded in fluid-tight relation to said inner and outer end plates coaxially of the roll, said second trunnion having a fluid passage coaxially therein and at least one radial port communicating outwardly from said trunnion passage to the inner ends of said radially extending passages, an arcuate fluid removal pipe rotatable with said roll interiorly thereof and having one end thereof opening interiorly of the peripheral chamber through said inner shell and its other end extending substantially axially of the roll, and a tube connected to said other end of the fluid pipe and extending coaxially of the roll outwardly through said second trunnion and the fluid passage therein.

5. A roll comprising inner and outer relatively spaced shells and end plates defining therebetween a peripheral fluid chamber having at one end thereof radial passages communicating therewith, trunnions at opposite ends of the roll coaxially thereof and the trunnion at said one end of the roll having a passage coaxially therein communicating with said radial passages for introducing steam under pressure to said peripheral fluid chamber at said one end of the roll, and a continuously open condensate removal pipe fixedly carried by the supporting trunnion at said one end of the roll and rotatable with said roll interiorly thereof, said pipe extending coaxially through the passage in the trunnion at said one end thereof and interiorly of the roll with its end opening interiorly of the peripheral chamber through said inner shell adjacent the opposite end of the roll.

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