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SUCTION ROLL

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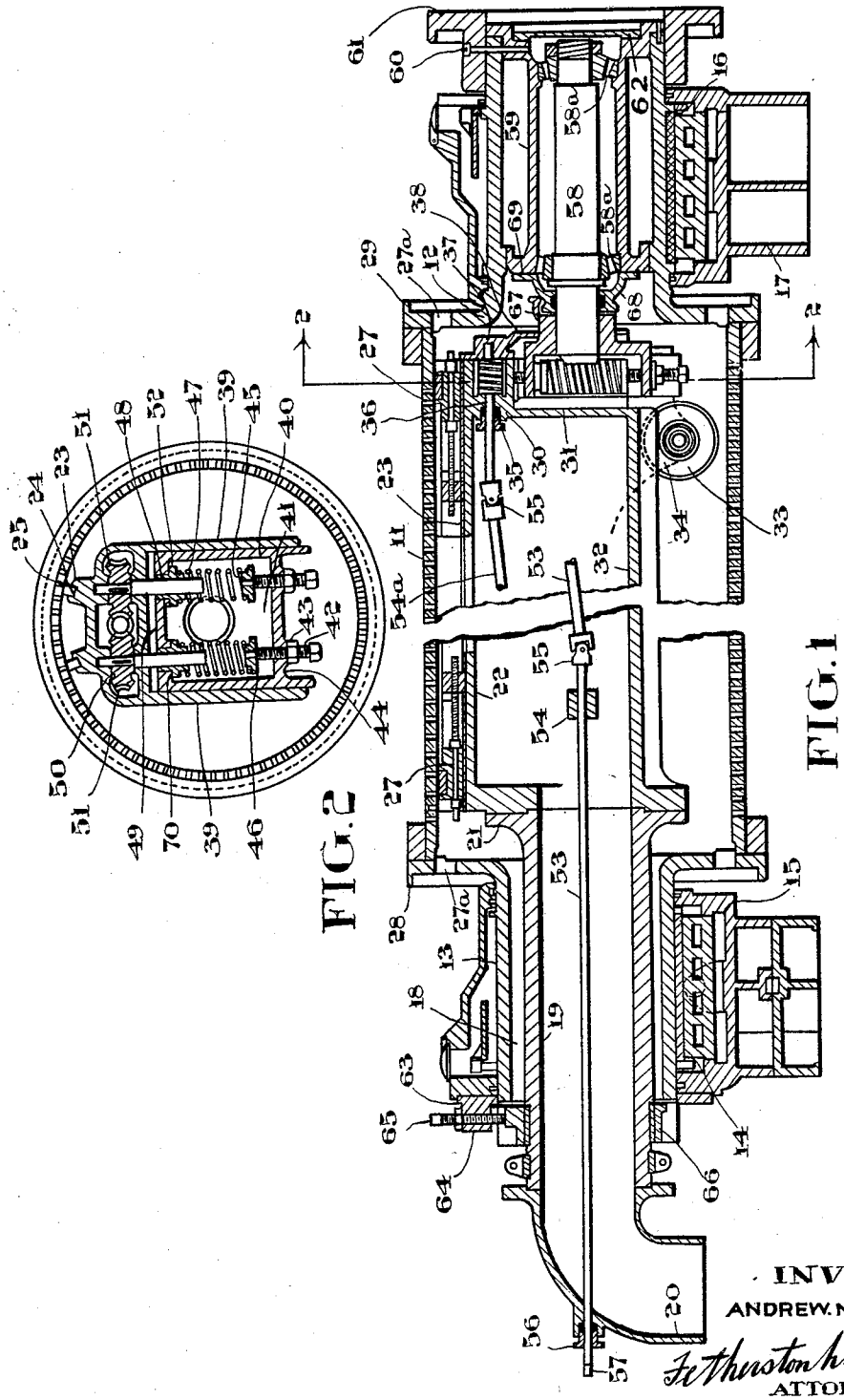


FIG. 1



FIG. 2

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# UNITED STATES PATENT OFFICE

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## SUCTION ROLL

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This invention relates to new and useful improvements in suction rolls, and the main object of the invention is to provide simple and effective means for adjusting the suction box within the roll in the radial direction, so that it will contact with the interior of the roll under a predetermined pressure.

Another object is to provide suction box adjusting means which will be operated from one end of the suction roll.

A further object is to provide a suction roll so mounted that it will be directly driven from the outside of the frame.

A still further object is to provide means within the driving sleeve to allow easy access to the suction box and its adjusting and movement limiting mechanism.

In my invention I provide a suction roll within which is mounted the suction box. The roll comprises a perforated shell secured to end bearing sleeves which are rotatably mounted in suitable bearings. The roll is adapted for continuous rotating movement at the same speed as the wire or felt of the paper making machine, and the suction box is adapted to remain stationary within the roll and at all times in air-tight contact with the interior surface of the roll, packing being provided between the box and the roll. The discharge connection from the suction box passes through the sleeve at one end of the roll and a limiting screw is secured to the bearing at this end and contacts with a collar secured to the said discharge pipe. The other end of the suction box is slidably mounted on a guide secured to a pin upon which are mounted, in spaced relation, anti-friction bearings which support a distance casting secured to the interior of the sleeve which may be driven from any source. This end of the box is so mounted that it rests on springs in the guides which allow deflection of the box within the roll. Means are also provided for regulating the pressure of the packing against the roll and means are provided for limiting the upward movement of the box. The pressure regulating means is controlled from the end of the roll remote from the end in which said means is mounted.

In the drawing which illustrates my improved suction roll:—

Figure 1 is a longitudinal cross sectional elevation of the suction roll.

Figure 2 is a sectional end elevation taken on the line 2—2 Figure 1.

Referring more particularly to the drawing, 11 designates a perforated cylindrical shell, the ends of which are secured to the flanged sleeves 12 and 13 by any suitable means. The sleeve 13 is rotatably mounted on a bushing 14 mounted in the lower half of the bearing 15. The other sleeve 12 is rotatably mounted on the bushing 16 secured to the lower half of the bearing 17. Extending through the aperture 18 of the sleeve 13 is the suction pipe connection 19, one end of which is connected to the elbow connection 20 which is connected to a source of suction not shown. The other end of the pipe is provided with a flange 21 which is connected to one end of a suction box 22. The upper edges 23 of the suction box are provided with channels 24 to receive the packing or sealing strips 25. The ends of the suction box are each provided with adjustable sealing members 26, which can be moved towards or away from the centre of the roll. The sealing members are mounted on the threaded spindles 27, access to the ends of which may be obtained through the openings 27*a* formed in the flanges 28 and 29 of the sleeves 13 and 12, respectively. The end 30 of the box is closed by means of the web 31. The bottom 32 of the box is spaced from the inner surface of the cylindrical shell and suitable supporting rollers 33 are mounted in bearings 34 projecting downwardly from the bottom of the box. These rollers are normally clear of the inside of the shell when the suction roll is in operation. The end of the suction box has a centrally disposed bearing 35 and rotatably mounted in said bearing is one end of a worm shaft 36, the other end of which is mounted in a bearing 37 formed in a cap or cover 38. The end of the box has depending sides 39 which frictionally engage with the sides of a guide 40, preferably made of square cross section with a recess 41 formed therein. A pair of adjusting screws 42 are mounted in thread-

ed apertures 43 formed in the lower rib 44. Secured to reduced sections 45 of the screws are the guide washers 46 for the compression springs 47. The upper ends of the springs fit into guides 52 slidably mounted in apertures 48 formed in the upper rib 49. Extending upwardly from the washers are the worm wheel spindles 50 to which are secured the worm wheels 51 which engage with worms formed in the worm shaft 36. The connection between the guides 52 and the spindles 50 is threaded, so that on rotation of the spindles, they move upwardly or downwardly to regulate the pressure of the packing or sealing members against the interior of the roll. A worm shaft rotating rod 53 extends horizontally through the centre of the suction pipe and is supported on a bearing 54 formed in the box. The rod 53 is connected to the worm shaft by means of a connecting rod 54a and universal connections 55 at each end of the rod. The operating rod passes through the elbow connection to the source of suction, and a suitable gland 56 is provided to seal the hole in the elbow. A suitable square end 57 is formed in the rod at the exposed end thereof for a spanner, key, or the like. The guide is secured to a suction box supporting spindle 58, which extends through the sleeve 12 and has formed on its surfaces, in spaced relation, collars for antifriction bearings 58a. These bearings are mounted on a flanged cylindrical distance piece 59 fitting into the sleeve 12. The distance piece is secured by bolts 60 to the sleeve and to a flange coupling 61. A cover plate 62 protects the end of the box supporting spindle. Secured to the bearing 15 is the washer 63 having an outwardly extending lug 64, through which is mounted an adjusting screw 65 which limits the upward movement of the suction box at the discharge end thereof, by contacting with a collar 66 secured to the suction pipe. The guide 40 has an outwardly extending lip 67 which covers a sealing gland 68 secured to the face 69 of the distance piece 59, to prevent water from entering the bearings. The guides 52 are provided with shoulders 70 which engage with the underside of the rib or web 44 to limit the upward movement of the suction box.

In operation the box within the roll is resiliently supported on the compression springs in the guide and the pressure of the springs may be adjusted by rotating the worm rotating shaft. The worm rotating shaft turns worm wheels and the threaded spindles attached thereto to raise the box to contact with the inner surface of the roll and depress the spring. The screws passing through the bottom of the guide also allow rough adjustments to be made. The upward movement of the box is limited by the shoulders formed in the upper spring guides contacting with the upper rib of the guide. The cylindrical distance piece within the sleeve 12 may be easily and quickly removed to allow access to the suction box adjusting mechanism. Rollers are provided for supporting the suction box on the bottom inner surface of the perforated cylinder when the supporting spindles for the said suction box are removed. The antifriction bearings between the cylindrical distance piece and the suction box supporting spindle reduced the friction between them to a minimum, so that there is no tendency for the box to rotate with the perforated cylinder. The roll is directly driven through the sleeve 12.

The device is very simple in construction and operation and provides means which may be operated from one side of the machine, or roll, for adjusting the pressure of the suction box within the suction roll. Means are also provided for limiting the upward movement of the box. The mechanism is accessible and easily controlled and adjusted to suit the wear on the sealing members at the top of the box.

Having thus described my invention, what I claim is:—

1. In a suction roll, a perforated cylinder, a suction box within the cylinder and supported on flexible means carried by said cylinder.

2. In a suction roll, a perforated cylinder, a suction box within the roll and supported on springs, and means for limiting the radial movement of the box.

3. In a suction roll, a perforated cylinder, a suction box non-rotatably mounted within the cylinder, means for limiting the radial movement of the box at one end, and adjustable resilient means for supporting the box at the other end, said supporting means being secured to a spindle extending inwardly of said cylinder.

4. In a suction roll, a perforated cylinder secured to sleeves rotatably mounted in bearings, a suction box non-rotatably mounted for radial movement in the cylinder, means to limit the radial movement of one end of said box, and mechanically operated means for regulating the pressure between the box and the cylinder and for limiting the radial movement of the box at the other end of the cylinder.

5. In a suction roll, a perforated cylinder secured to sleeves rotatably mounted in bearings, a suction box non-rotatably mounted in the cylinder, one end of the box being slidably mounted on a guide and resiliently supported on springs, mechanical means for adjusting the effective pressure of the springs, means slidably mounted in the guides and contacting with the springs for limiting the radial movement of the box, and means carried by the sleeve adjacent said guide to support same.

6. In a suction roll, a perforated cylinder

secured to sleeves at each end rotatably mounted on bearings, a suction box non-rotatably mounted within the cylinder and passing through on of the sleeves, a worm meshing with worm wheels mounted in the other end of the box which has depending walls engaging with a guide secured to a spindle projecting from the adjacent sleeve, springs mounted in said guide, and spindles secured to the worm wheels and provided with means adapted to limit the radial movement of said box.

7. In a suction roll, a perforated cylinder secured at its ends to sleeves rotatably mounted on bearings, a suction box non-rotatably mounted within the cylinder and passing through one of the sleeves; means for limiting radial movement of said suction box end, a box supporting spindle mounted in anti-friction bearings in the other sleeve, a guide secured to the spindle, adjusting screws in the lower part of the guide and having spring holders secured thereto, compression springs in the said holders, upper spring holders slidably mounted in the guide and adjustably secured to the box and adapted to limit the radial movement of same, and means operable from the suction pipe end of the box for adjusting the compression of the springs.

8. In combination with a suction box for suction rolls, gear driven means for moving an end of said box radially relatively to the longitudinal axis of the roll and means for operating the same from a point remote therefrom.

9. In combination with a suction box for suction rolls, gear driven means carried by said suction box for moving an end of said box radially relatively to the longitudinal axis of the roll, and means for operating the same from a point remote therefrom.

10. In combination with a suction box for suction rolls, means carried by one end of said suction box for moving an end of said box radially relatively to the longitudinal axis of the roll, and means for operating the same from a point remote therefrom.

11. A suction roll comprising a shell, a suction box extending longitudinally within said shell from end to end, gearing carried by the suction box adjacent one end of the shell and adapted to actuate the box radially relatively to the longitudinal axis of the roll and operating means therefor connected thereto and extending to a point adjacent the opposite end of said suction box.

12. A suction roll comprising a shell, a suction box extending longitudinally within said shell from end to end, a worm and co-operating gear carried by the suction box adjacent one end of the shell and adapted to actuate the box radially relatively to the longitudinal axis of the roll and operating means therefor connected thereto and extending to a point adjacent the opposite end of said suction box.

13. In combination with a suction box, gearing actuated means exterior to said suction box for moving said box bodily radially and means for operating the same, and means for actuating said operating means from a point remote therefrom.

14. In combination with a suction box, gearing actuated means exterior to said suction box for moving said box radially, said means acting against the suction box and against a part separate and independent of said box, and means operating the moving means from a point remote therefrom.

15. In combination with a suction box for suction rolls, gearing carried by said box and adapted to move said box radially relatively to the longitudinal axis of the roll, means for operating the same from a point remote therefrom and means adjacent said operating means for regulating its operation.

16. A suction roll comprising a shell having one closed end, a suction box extending longitudinally within said shell from end to end, gearing carried by the suction box and adjacent the closed end of the shell and adapted to actuate the box radially relatively to the longitudinal axis of the roll, operating means therefor connected thereto and extending to a point adjacent the opposite end of said suction box, and means for actuating the opposite end of said box radially.

17. In combination with a suction box for suction rolls, a guide yielding box supporting means carried by said guide, gearing carried by said box and adapted to actuate said supporting means, and means for actuating said gearing.

18. In combination with a suction box for suction rolls, a guide, yielding box supporting means carried by said guide, gearing carried by said box and adapted to actuate said supporting means, and means for actuating said gearing from a point remote therefrom.

19. In combination with a suction box for suction rolls, a guide, box supporting means carried by said guide, gearing carried by said box and adapted to actuate said box supporting means, and means for actuating said gearing.

20. In combination with a suction box for suction rolls, a guide, box supporting means carried by said guide, means for adjusting said supporting means, gearing carried by said box and adapted to actuate said box supporting means, and means for actuating said gearing from a point remote therefrom.

21. In combination with a suction box for suction rolls, a guide, supporting springs carried by said guide, box supporting means carried by said box and engaged by said springs, means for actuating said supports laterally relatively to said box, and means

for operating said actuating means from a point remote therefrom.

22. In combination with a suction box for suction rolls, a guide, supporting springs carried by said guide, box supporting means carried by said box and engaged by said springs, gearing for actuating said supports laterally relatively to said box, and means for operating said gearing from a point remote therefrom.

23. In combination with a suction box for suction rolls, a guide, supporting springs carried by said guide, means for regulating the compression of said springs, box supporting means carried by said box and engaged by said springs, means for actuating said supports laterally relatively to said box, and means for operating said actuating means from a point remote therefrom.

24. A suction roll comprising a shell having a sleeve of reduced diameter attached thereto, direct driving connections carried by said sleeve, a spindle mounted within said sleeve, a guide carried thereby, and a suction box within said shell and movably mounted at one end on said guide.

25. A suction roll comprising a shell having a sleeve of reduced diameter attached thereto, direct driving connections carried by said sleeve, a spindle journaled in said sleeve, a suction box within said shell and carried by said spindle, and means for moving said box radially relatively to the longitudinal axis of the roll relatively to said spindle.

26. A suction roll comprising a shell having a sleeve of reduced diameter attached thereto, a distance piece mounted in one end of said shell, a spindle journaled therein, a suction box within said shell and carried by said spindle, and means for moving said box radially relatively to the longitudinal axis of the roll relatively to said spindle.

27. A suction roll comprising a shell having a sleeve of reduced diameter attached thereto, a suction box within said roll, means within said sleeve for supporting one end of said box, and gear driven means for moving said box radially relatively to the longitudinal axis of the roll.

28. A suction roll comprising a shell having a sleeve of reduced diameter attached thereto, a suction box within said roll, means within said sleeve for supporting one end of said box, gear driven means for moving said box radially relatively to the longitudinal axis of the roll, and means for operating said last named means from a point remote therefrom.

29. A suction roll comprising, a shell having a closed end, a suction box within said shell, gearing carried by the suction box end nearer said closed end and adapted to move the box radially relatively to the longitudinal axis of the roll, operating means therefor connected thereto and extending to a point remote from said gearing.

30. In combination, a suction roll shell provided with a reduced end, a spindle removably journaled in said end, a member carried by said spindle, and means for yieldingly supporting one end of a suction box on said member.

31. In combination, a suction roll shell provided with a reduced end, a spindle removably journaled in said end, a member carried by said spindle, means for yieldingly supporting one end of a suction box on said member, and means for adjusting said yielding supporting means.

In witness whereof, I have hereunto set my hand.

ANDREW N. RUSSELL.