May 19, 1931. W. H. MILLSPAUGH 1,805,671

GEARLESS SUCTION ROLL

Filed March 17, 1928 2 Sheets-Sheet 1

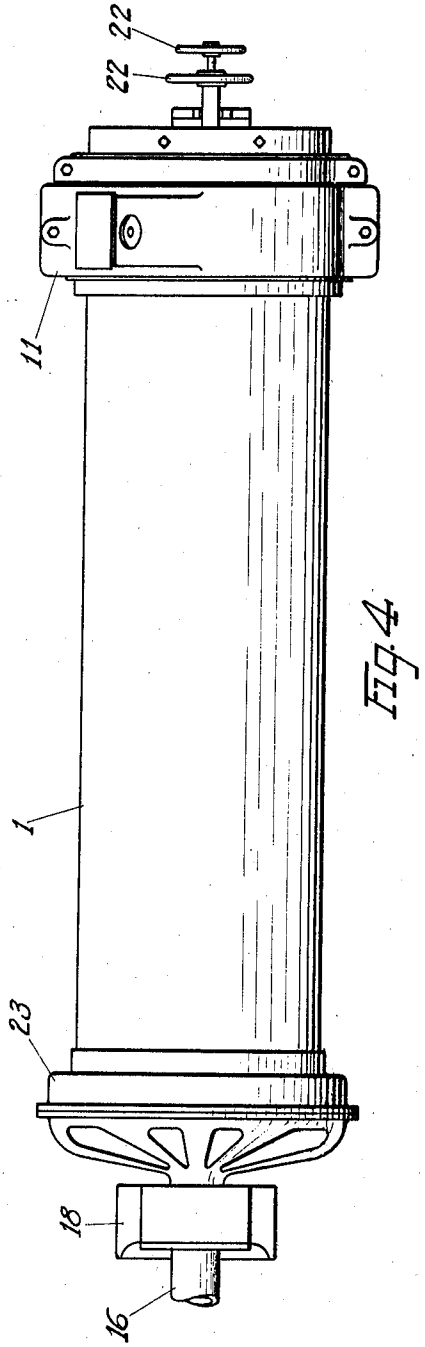


Fig. 4

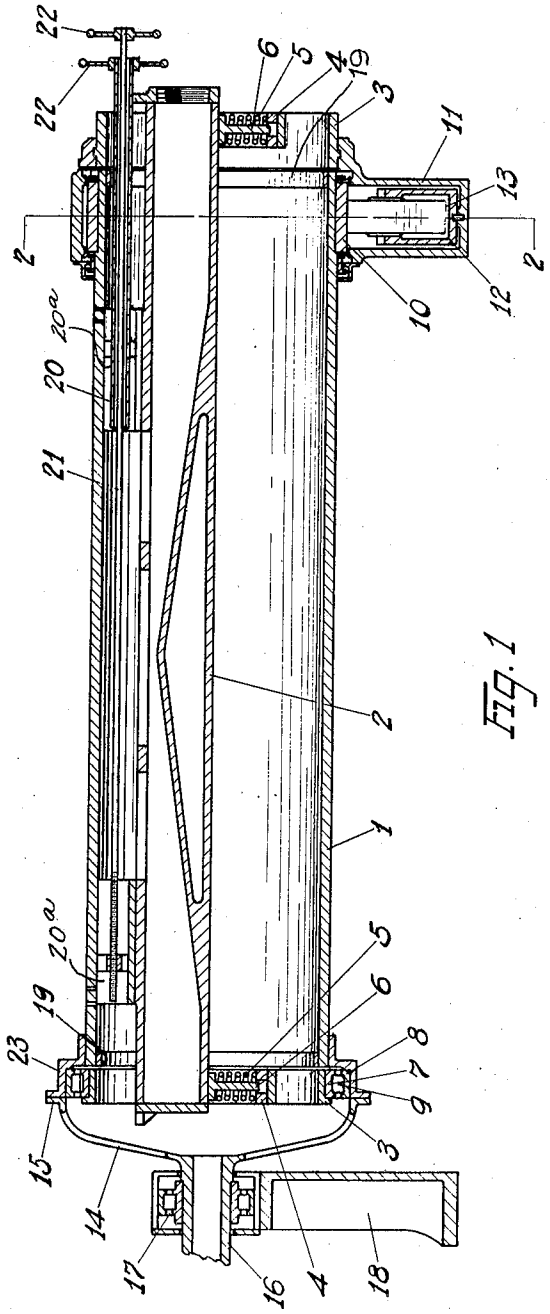


Fig. 1

INVENTOR.
William H. Millspaugh
BY William J. Babcock
ATTORNEYS.

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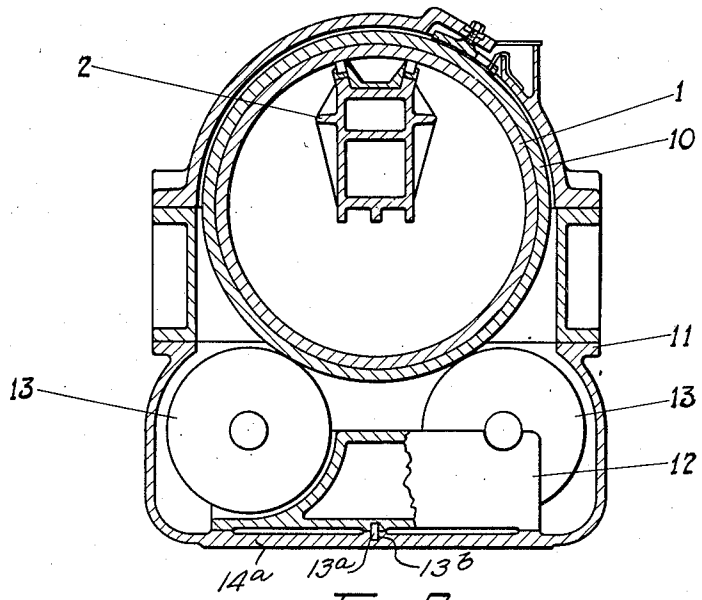


Fig. 2

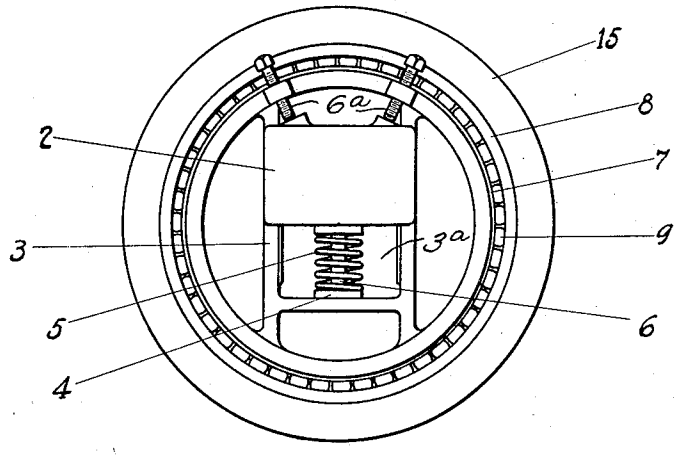


Fig. 3

INVENTOR.
William H. Millspaugh
BY William S. Babcock
ATTORNEYS.

Patented May 19, 1931 1,805,671

UNITED STATES PATENT OFFICE

WILLIAM H. MILLSPAUGH, OF SANDUSKY, OHIO, ASSIGNOR TO THE PAPER & TEXTILE MACHINERY COMPANY, OF SANDUSKY, OHIO

GEARLESS SUCTION ROLL

Application filed March 17, 1928. Serial No. 262,474.

The present invention relates to paper making machinery and more particularly to a suction roll gearless drive or means for driving or revolving the perforate shell of the roll by other than gears.

It has been common practice in recent years to drive the shell by direct intermeshing gears, one gear being rigidly fixed to the shell at or near one end, in any suitable or well known manner. Necessarily, this increased the over-all diameter by the difference between the exterior diameters of the shell and gear, making a larger and more cumbersome roll at that end. In the gear driven type there is a considerable loss of power through friction of the engaging gear teeth—roughly, 20% or more. In the gear driven type there are, obviously, at least two intermeshing gears between the in-drive shaft and the roll which it drives. Clearly, extra gears in the gear driven roll, as compared with the gearless drive, give added opportunities for repairs and the other recognized disadvantages including the stoppage of the machine for the repairs to the gear drive.

The main objects of the present invention are to avoid this and other recognized difficulties met with in the gear driven roll.

In order to more clearly disclose the construction, operation, and use of the invention, reference should be had to the accompanying drawings forming part of the present application. Throughout the several figures of the drawings like reference characters designate the same parts in the several views.

In the drawings:

Fig. 1 is a central vertical longitudinal cross section through one preferred form of the invention.

Fig. 2 is a cross section on line 2—2 of Fig. 1 looking in the direction of the arrows.

Fig. 3 is a left hand end view of Fig. 1, with the drive omitted, and

Fig. 4 is a top plan view.

The type of gear driven suction roll in general use throughout the paper making industry, both in this country and abroad is pretty well disclosed in the re-issue patent of Millspaugh 13,100, dated April 12, 1910. For friction reduction or easier driving, roller bearing mounting of the shell as in re-issue Millspaugh Patent 16,501 dated December 7, 1926, is used. For details as to mounting of the suction box within the shell and the antifriction roller support, reference is made to said patents. The same is true as to the construction and arrangement of the suction box or chamber and its disposition within the shell, in general.

Referring to the drawings in detail, 1 indicates the perforate shell or roll through which the suction operates or is effective on the pulp, in the process of paper making. Within this shell is supported the suction box 2 of usual and well known construction. Its longitudinal edges adjacent the inner face of the shell are provided with the usual well known packing strips, all as clearly shown in re-issue Patent 13,100.

The ends of said box are slidably mounted in heads 3 having U-shaped openings 3^a therein, in which said ends are positioned. The side walls of said box at said ends are provided with vertical grooves (not shown) which receive the walls of said heads defining the sides of said openings to provide for this slidable mounting. On the walls forming the bottom end of each of said openings is disposed an annular plate or washer 4 to act as a spring seat for each coil suction box supporting spring 5. A stud or pin 6 at each end of the suction box extends through and centers each spring so that it will be kept in proper position. As will be readily understood, these springs unless counteracted would force the suction box into tight frictional engagement with the inner wall of the shell. To avoid this, set screws 3^a are provided in the same way as in said re-issue patent.

In the gear driven construction in general use, the blocks or heads for supporting the ends of the suction box are both carried by frames, brackets or other supports, entirely exterior to the shell. In the gearless drive of this invention that is not possible at the drive end of the shell, as will be evident. It is possible only at the opposite or free end, the front, as it is commonly referred to.

Therefore, the head or block at the front end in this invention is substantially the same as in the re-issue Patent 13,100. It is carried by a stationary bracket fixed to the machine frame.

At the opposite or drive end on the other hand, the head has formed about its outer periphery a suitable inner bearing race 7, between which and a similar outer bearing race 8 carried by an annular radially offset wall of a ring shaped plate or collar secured to the outer face of the shell near that end is disposed a set of rollers or other suitable antifriction bearings 9. At this end the head or block is free and unconnected and rides freely on these bearings. Thus, while the suction box end at the drive end is free, at the opposite end it is securely and rigidly held against any movement relatively to the shell, except the slight adjustment provided by the set screws. For supporting this end of the shell a suitable frame 11, preferably of U-shaped construction is provided. Within this frame is mounted a similarly shaped cradle 12 in which are journaled the antifrictionally mounted shell supporting rolls 13. A suitable steel bearing band is shrunk onto the shell to take the wear incident to travel on said rolls 13. The cradle, it will be seen, is constructed and mounted to have substantially universal movement, to a limited extent. For this purpose it is slightly spaced, laterally, from the adjacent side walls of the enclosed frame, as also at the bottom, except at three points—the ends and center. At the center, the cradle is horizontally swiveled in the bottom of the frame by a pin 13^a extending from the cradle and freely rotatable in a corresponding bore or perforation 13^b in the base 14^a of the U-shaped frame.

The suction is taken in the usual way, but from the front end of the roll and need not be described here as it forms no part of the present invention.

At the drive end, a disc or circular head 14 is provided as the driving connection. This disk is provided with a peripheral flange 15 which is securely fixed to the shell in any suitable and well known way. Preferably in the large diameter rolls, in order to reduce the over-all diameter as much as possible, the flange is connected on the inside of the shell. It has not been thought advisable to add to the record of the case by the further illustration covering this point. From the center of the disk extends the indrive shaft 16 which may be driven direct from a motor or any usual driving machinery (not shown). Obviously, it may also be driven indirectly through suitable connections. At a point near the disk or driving head the shaft 16 is journaled in suitable antifriction bearings 17 in the standard 18. Or, at this end, also, the shell may be mounted as at the opposite end, a Babbitt bearing being substituted for the antifriction bearing of the drive shaft, and clutch connection made direct with the head. The member or element which immediately connects the shell to the drive shaft has been shown and described as a flanged disk or plate and as fixed to the shell. Clearly such a disk may be cut away to practically any desired extent until only a fork of two opposite arms remains, the free ends of these arms being secured in the same manner as stated for the flange. Of course, any other number of arms may be similarly provided. The disk construction described is a strong, efficient, compact and economical form and may be more readily and quickly made. In some cases, especially with smaller diameter rolls, it may be preferable to have a detachable instead of a fixed connection. This may be done in many ways, as by pins or studs on the shell, cooperating with key-hole, bayonet, or other locking slots in the flange or in the arm ends; or, inside, the flange or arm ends may be simply bolt-and-nut connected.

It is the intention, of course, to include in this application and to cover by the appended claims both the fixed and detachable connections. A ready and accessible deckle adjustment for this construction is provided at the front end of the machine and made as compact as practicable to adapt it to the least possible space. Said adjustment comprises two separate and independent shafts 20 and 21 threaded at their free ends into deckle blocks or heads 20^a longitudinally slidable between the side walls of the suction box and the bottom wall thereof and adjacent shell surface, and in simultaneous contact with all four surfaces, all as clearly shown in Fig. 1. The shaft 20 is tubular and exteriorly screw threaded through the deckle head nearest the suction end of the box and is journaled in the suction box supporting head 3 at that end. Shaft 21, on the other hand, which preferably, is solid, extends through and is journaled in the shaft 20. It is threaded into the deckle head lying nearer the opposite end of the shell. Both shafts are provided with hand wheels, cranks, or any other suitable operating means 22. They are oppositely threaded to cause the blocks to travel inwardly from opposite sides toward the center. This makes a simple, efficient, and compact construction whereby either deckle may be adjusted to any extent desired without in any degree affecting the other, while at the same time occupying the space required for the single adjusting means for one deckle head only.

It will be clear on reference to Fig. 1 that there are only three sets of bearings all together, and that all three sets are very easily and quickly accessible at any and all times. In case of damage with resulting need of repair and replacement this is very im-

portant and results in a big saving in time in making the repairs, as well as the saving of the heavy loss in the operation and production of the machine during the time it is idle for repairs.

The construction thus provided is compact, simple, efficient, of least possible over-all diameter, and has the minimum number of operating parts.

It has been found in practice, under actual working conditions, that considerably more waste water reaches the interior of the shell than will readily flow out through the perforations of the lower side during the operation, unassisted. This excess runs out either end over the edge and into the bearings or other working parts. It carries with it grit and fibre which cause excessive wear on these parts. If the flow is checked so that this out-flow is prevented, the slight head afforded by the accumulation will force all of it through the perforations, thereby completely avoiding such otherwise excessive wear. To accomplish this result an annular dam is provided in each end in the form of a ring or band 19 of sufficient thickness or height, radially, to provide an ample wall or dam to check the longitudinal flow of any water within the shell, until it passes through the perforations in the lower part of the shell.

In practice, of course, a suitable clutch of any unusual and well known type and construction may be interposed at some point between the power unit and the driven roll. Clutches in similar positions being well understood, it is not necessary to enter into detailed illustration or description of the same here.

Obviously, changes may be made in the construction, arrangement, and disposition of various parts of the invention within the scope of the appended claims, without in any sense departing from the field of the invention, and it is meant to include all such within this application wherein only a single preferred form has been disclosed by way of practical illustration only.

What I claim is:

1. In combination with a suction roll shell, means adapted to create within said shell a predetermined hydraulic head.

2. In combination with a suction roll shell, a radially extending circumferential band adapted to create a predetermined hydraulic head.

3. In combination with a suction roll shell means within said shell adjacent each end thereof and adapted to create within said shell a hydraulic head.

4. In combination with a suction roll shell, radially extending circumferential bands adjacent the respective ends and adapted to create a hydraulic head.

5. A suction roll comprising a perforated shell, a stationary head for one end of said shell supported beyond the end of said shell, a second head in the other end of said shell forming a journal for said latter end, a suction box in said shell supported in said heads, and rigid means secured to the latter end of said shell for rotating said shell about said second end.

6. A suction roll comprising a perforated shell, a stationary head for one end of said shell situated and supported beyond said end, a second stationary head for the other end of said shell positioned in said end, roller bearings between said latter head and end, said heads having aligned openings therein, a suction box in said shell with its ends movably mounted in said openings, and rigid means secured to the latter end of said shell for rotating the same about said second head.

7. A suction roll comprising a perforated shell having an enlargement at one end thereof, a stationary head in said enlargement, bearings between said head and enlargement, a second stationary head located and fixedly supported beyond the other end of said shell, said heads having aligned openings therein, a suction box in said shell with its ends mounted in said openings so as to be vertically movable therein, resilient means for supporting said suction box in said openings, and rigid means secured to said enlarged shell end for rotating said shell about said first head as a journal and relative to said second head.

8. A driving and supporting mechanism for a suction roll having a perforate shell comprising a pair of spaced bearing rolls beneath one end of said shell, a wear-resisting band on said shell contacting said roll, an enlarged extension forming a continuation of the opposite end of said shell, a head in said extension forming a journal for said end, a drive shaft, bearings supporting said shaft, and a disc rigid with said shaft and enlarged extension whereby said shaft rotates said shell on said bearing rolls and about said head.

9. A device as in claim 8 wherein antifriction bearing means are provided between said head and end extension.

In testimony whereof I affix my signature.

WILLIAM H. MILLSPAUGH.