

Dec. 1, 1931.

W. H. MILLSPAUGH

1,834,470

SUCTION ROLL

Filed Sept. 28, 1926

2 Sheets-Sheet 1

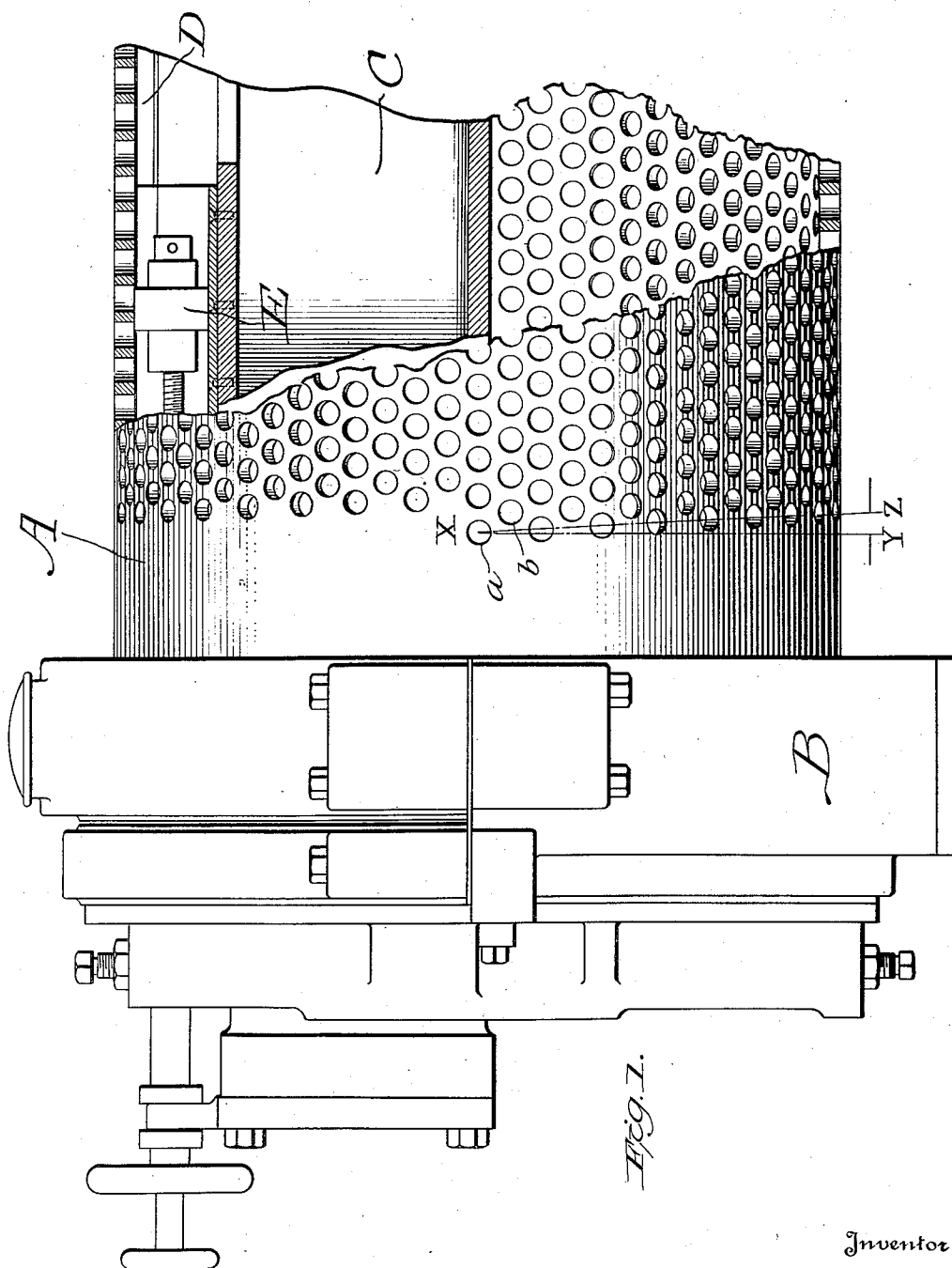


Fig. 1.

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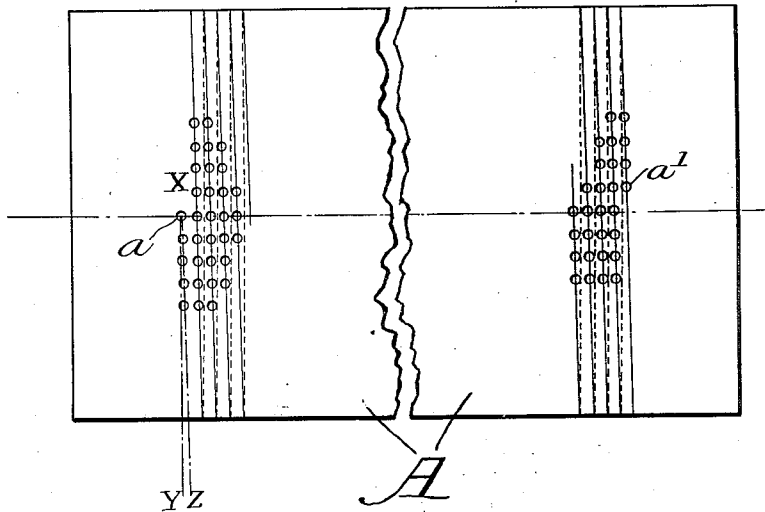
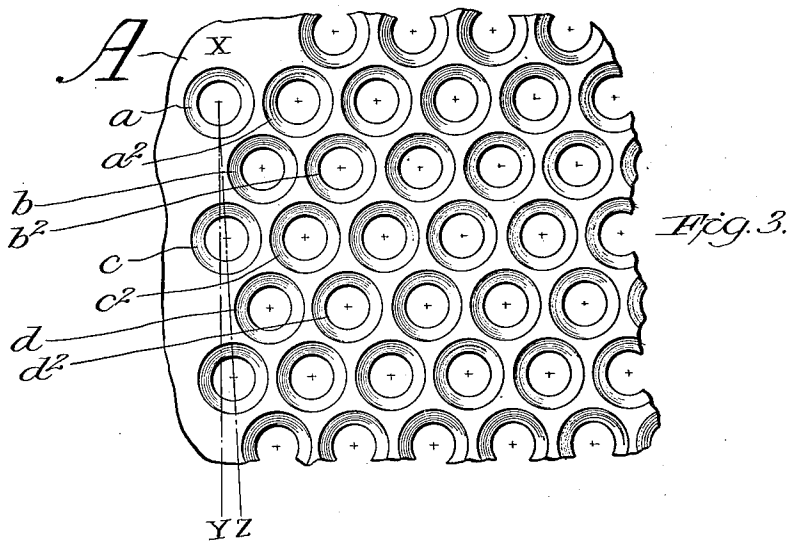
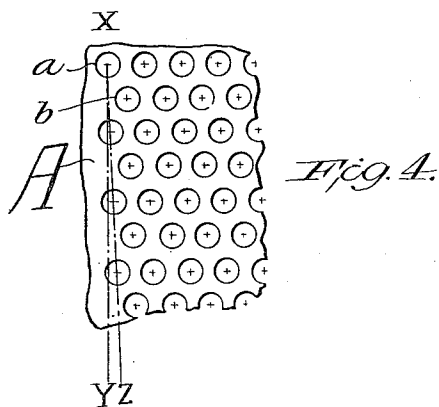
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Fig. 2.



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SUCTION ROLL

Application filed September 28, 1926. Serial No. 138,284.

This invention relates to suction rolls. One object of the invention is to provide a suction roll which will give improved results in operation, more particularly with respect to distribution of wear between the revolving foraminous shell or cylinder and the suction box or boxes cooperating therewith. A further object is to provide a construction susceptible of accurate manufacture in respect to the drilling of the perforations in the metal shell.

Fig. 1 shows an illustrative embodiment of the invention applied for example to one well known type of suction roll, a portion of which including one of its end bearing structures is shown in side elevation, while a portion of the cylinder and suction box is shown in section.

Fig. 2 represents a reduced side elevation of the metal shell or cylinder, omitting its intermediate portion, and showing certain of the shell perforations at opposite ends.

Fig. 3 shows on an enlarged scale a fragment of the metal shell.

Fig. 4 shows a fragment of another such shell having perforations of somewhat different dimensions and spacing from those shown in the preceding figure.

In the drawings A denotes the rotating cylinder, which is a foraminous or perforated metal shell; B is a bearing structure in which one end of the cylinder is journaled; C is a stationary suction box supported within and cooperating with the cylinder; D indicates one of the longitudinal box packings; and E denotes an adjustable end packing head or "deckle".

A distinguishing feature of the illustrative suction roll is provision for uniform distribution of wear between the inner surface of the perforated shell and the box packings, which in this instance is accomplished by means of an arrangement of the shell perforations. Instead of being arranged in annular rows around the cylinder, as was customary in suction roll shells prior to this invention, the perforations are so arranged that those in sequence around the circumference of the cylinder are located at points successively offset

longitudinally from one another, or in other words the lines or rows of holes around the cylinder are inclined to transverse planes perpendicular to the axis of the cylinder. This is accomplished by a spiral arrangement of the shell perforations, i. e. by disposing the perforations on an imaginary spiral line or lines winding around the cylinder from end to end; the convolutions of such a spiral being indicated for example in Fig. 2.

In the several figures of the drawings, the line X—Y indicates a plane at right angles to the cylinder. The line X—Z indicates a spiral, according to which the shell perforations are disposed. The angle between said lines indicates the pitch of such spiral, which is preferably such that the space between successive convolutions thereof is the distance between centers of adjacent perforations in the same longitudinal row. Assuming all the perforations to be drilled through the shell with their centers on an imaginary spiral line as indicated, or with their centers on two or more such imaginary spiral lines winding around the cylinder, it will be apparent that the centers of the perforations will in general be located in different transverse planes perpendicular to the axis of the cylinder. No two perforations on the same spiral line can lie in the same such plane. And by adopting a spiral of small pitch, the said planes of the centers of the perforations will be closely adjacent. Thus the perforations in sequence around the cylinder will successively traverse the box packings at different though closely adjacent points, thereby avoiding concentration of wear at any particular points and obtaining a substantially uniform distribution of the wear between the shell and box packings in contact therewith. This of course tends to maintain the efficiency of the suction roll for vacuum action purposes, and to prolong its durability and to lessen maintenance costs.

Referring to Fig. 2, the perforations therein shown are arranged in longitudinal rows spaced uniformly around the cylinder, with the perforations of the individual rows at uniform distances apart; and the rows themselves are arranged according to a spiral so

that successive perforations in each row lie on successive convolutions of an imaginary spiral line, and the corresponding perforations of the several rows lie on the same convolution of such spiral, while the whole number of perforations so disposed constitute a single spiral row or series winding around and around the cylinder, commencing with the perforation a at one end and terminating with the perforation a^2 at the opposite end.

For the sake of obtaining the greatest practicable number and closest practicable spacing of perforations of a given size, the shell as illustrated in Figs. 1 and 3 is provided with a second spiral series of perforations arranged in longitudinal rows alternating with and staggered relative to the rows of perforations illustrated in Fig. 2, so that the perforations of one row lie between and are closely adjacent to the perforations of adjacent rows. Thus in Fig. 3, intermediate rows of perforations such as those commencing at a and c alternate with rows of intermediate perforations such as those commencing at b and d . The said intermediate rows of perforations are arranged according to a spiral in the same manner as described with reference to Fig. 2. Thus in this instance there are two spiral series of perforations winding around and around the cylinder, commencing with the perforations a and b . For instance, in Fig. 3 the perforations a , c and a^2 , c^2 are on successive convolutions of one spiral, while the perforations b , d and b^2 , d^2 are on successive convolutions of another such spiral. This arrangement obtains a greater number and closer spacing of perforations than would be possible with a single spiral series. And the arrangement of the perforations in longitudinal rows is conducive to convenience and accuracy in the operation of drilling the perforations in the shell, since the successive longitudinal rows of perforations may be accurately drilled with a gang of properly spaced drills upon determining the location of the first perforation of each row.

In Fig. 3 the shell perforations are represented as countersunk at their outer ends, as is frequently desirable, more particularly for use in suction couch rolls for paper machines, in order to reduce the external surface area of the shell and thereby obtain the greatest possible effect of the vacuum action on the sheet of paper or material traversing the vacuum area of the suction roll. Where the suction roll is used as a suction press roll, as for instance in the type of organization described in U. S. patent to Millspaugh No. 1,163,253 of December 7, 1915, the character and arrangement of perforations shown in Fig. 4 is preferred.

Obviously the invention is not limited to the particular embodiment thereof herein illustrated and described. Features thereof may advantageously be used in various dif-

ferent combinations and subcombinations. It will also be understood that the invention is applicable to various types or constructions of suction rolls. The particular suction roll selected for illustration is of the general type described in the Millspaugh U. S. Patent No. 895,283, dated August 4, 1908, reissued April 12, 1910, as No. 13,100, and has suction box equipment of the type disclosed in Millspaugh U. S. Patent No. 1,025,822, dated May 7, 1912, to which patents reference is made for description of details if desired. However, the nature of the illustrative suction roll will be readily apparent to those skilled in the art.

I claim as my invention:

1. A suction-roll comprising a cooperating shell and box and having the perforations of the shell so arranged that the shell perforations in sequence circumferentially of the shell traverse the box packings at points successively offset from one another longitudinally by a distance not greater than one-half the diameter of the perforations, so as to distribute the wear between the perforated shell and box.

2. A suction-roll comprising a perforated rotary shell and a stationary box having a packing engaging the inner surface of the shell, the perforations in the shell being so arranged that in every revolution of the shell the perforations successively traversing the packing have successively offset paths thereacross, so that the wear of the shell on the packing is distributed substantially uniformly along the packing.

3. A suction-roll shell having its perforations positioned on two continuous spirals.

4. A suction-roll shell having longitudinal rows of perforations, corresponding perforations of said rows being on a continuous spiral.

5. A suction-roll having its shell perforations arranged so that the perforations distributed about the shell are in general at different distances from the end of the shell or centered on different planes perpendicular to the shell axis.

6. A suction-roll shell having closely distributed perforations, the perforations in sequence circumferentially of the shell being centered on different but closely adjacent planes perpendicular to the axis of the shell so that when the shell is rotated in contact with a suction-box the perforations successively traversing the packings will have successively offset paths thereacross, for distributing the wear between the shell and box packings.

7. A suction-roll shell having its perforations arranged according to a spiral of small pitch continuous from end to end of the perforated portion of the shell and having a plurality of closely related convolutions about the shell.

8. A suction-roll shell having uniformly spaced rows of uniformly spaced perforations, corresponding perforations of successive rows being successively offset longitudinally by equal longitudinal distances which
5 are small fractions of the distance between the centers of adjacent perforations of a row.

9. A suction roll having a multiplicity of perforations, with the centers of all the perforations arranged on a single spiral upon
10 the surface of the roll.

10. A suction roll shell having closely distributed perforations arranged in circumferentially extending rows other than circular
15 and of such inclination with respect to a plane at right angles to the shell axis that the perforations in sequence circumferentially of the shell are successively offset from one another longitudinally by a distance not greater than
20 one-half the diameter of the perforations.

11. A suction roll shell having its perforations centered on a plurality of intertwined spirals of such pitch that the perforations in sequence circumferentially of the shell are
25 successively offset from one another longitudinally by a distance not greater than one-half the diameter of the perforations.

12. A suction roll shell having closely distributed perforations disposed in circumferentially extending sequences of such obliquity
30 to a plane at right angles to the shell axis that a plurality of longitudinally offset perforations intervene between any two perforations centered on the same plane at right angles to
35 the shell axis.

13. A suction roll shell having closely distributed perforations disposed in parallel continuous spiral sequences of such pitch that a plurality of longitudinally offset perforations intervene between any two perforations
40 centered on the same plane at right angles to the shell axis.

In testimony whereof I affix my signature.

WILLIAM H. MILLSAUGH.