Feb. 2, 1932. G. D. KILBERRY 1,843,876

PRESS FOR USE IN PAPER MAKING

Filed March 8, 1927 2 Sheets-Sheet 1

Fig. 1.

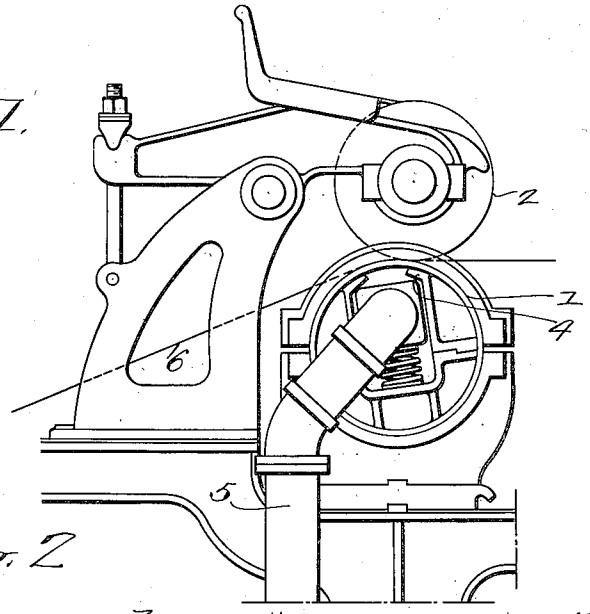
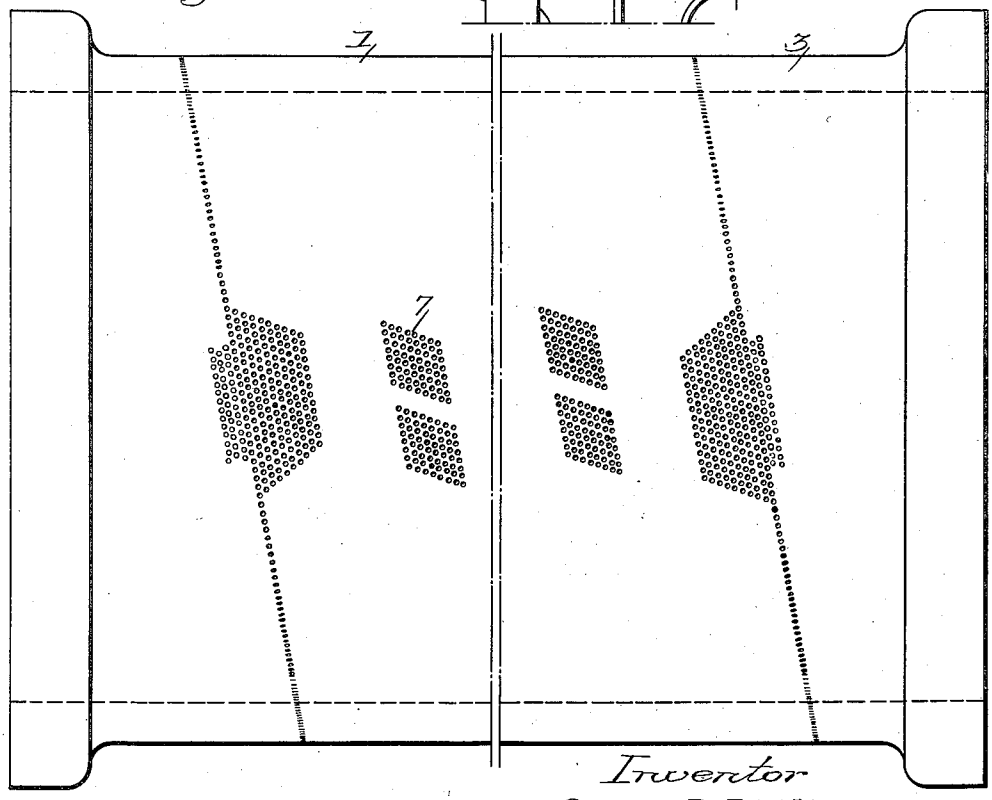


Fig. 2



Inventor
George D. Kilberry
by his Attorneys
Howson & Howson

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Fig. 3.

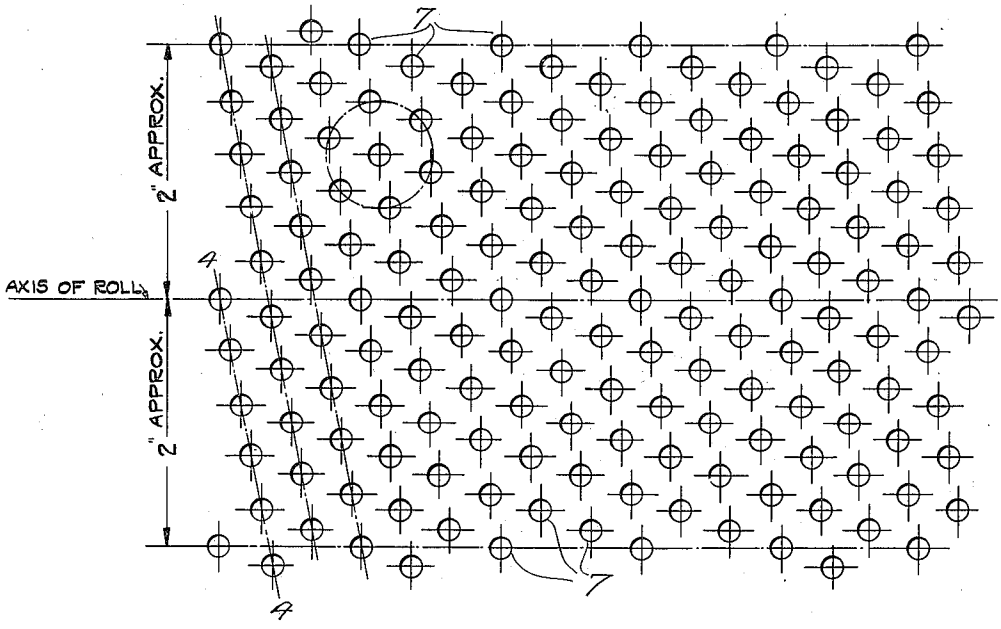
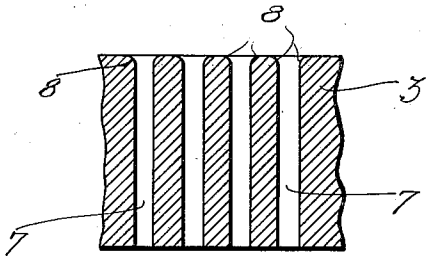


Fig. 4.



Inventor:-
George D. Kilberry.
by his Attorneys.
Howson & Howson

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UNITED STATES PATENT OFFICE

GEORGE D. KILBERRY, OF EAST DOWNINGTOWN, PENNSYLVANIA, ASSIGNOR TO DOWNINGTOWN MANUFACTURING COMPANY, OF DOWNINGTOWN, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

PRESS FOR USE IN PAPER MAKING

Continuation of application Serial No. 13,629, filed March 6, 1925. This application filed March 8, 1927. Serial No. 173,743.

This specification is a continuation of the subject matter contained in application filed by me, March 6, 1925, Serial No. 13,629.

This invention relates to presses for use in paper making, particularly presses of this type in which the paper, preferably with a carrier felt, is passed between two rolls one of which is perforated for removing moisture and the other of which is a pressure roll for applying pressure to the perforated roll. The perforated roll is provided with a suction box for applying suction at the line of contact between the two rolls.

The principal object of the invention is to provide means whereby the pressure exerted on the paper between the two rolls will be kept more nearly uniform than has heretofore been the practice.

More specifically, the object of the invention is to provide an improved construction for the rotatable shell of the perforated roll whereby more uniform pressure and other advantageous conditions are obtained.

In the accompanying drawings which illustrate one embodiment of the invention:—

Figure 1 is a side view illustrating somewhat diagrammatically a press of the type to which the invention is applicable;

Fig. 2 is an enlarged detail view of the rotatable shell of the perforated roll;

Fig. 3 is a still further enlarged fragmentary view showing in development the arrangement of the holes in the perforated shell; and

Fig. 4 is a fragmentary section through the roll as seen along the line 4—4 of Fig. 3.

Referring to the drawings, particularly, Fig. 1, the perforated roll 1 and the pressure roll 2 are mounted in a frame so that they may be suitably rotated and supported. The support for the pressure roll is movable in such a manner that the roll can adjust itself to apply the required pressure to the perforated roll.

As to many of the details of construction, except as hereinafter described, the perforated roll may be of any usual or desired construction, but it is preferably a suction roll and it may take the form shown in my copending application for suction rolls, Serial No. 699,421, filed March 15, 1924.

In general, the roll comprises a rotatable outer shell 3, shown in detail in Figs. 2, 3 and 4, and a non-rotatable suction box 4 which is mounted within the shell and arranged to apply suction to a segment of the shell at the line of contact with the roll 2 and throughout the effective length of the rolls.

The suction box is suitably connected with a pump or other vacuum means, a pipe 5 being shown for this purpose.

After the paper has been formed in any suitable way, it moves between the rolls 1 and 2, ordinarily being carried by a felt 6.

Water from the wet paper is drawn through the felt into the suction roll and the press roll 2 cooperates with the suction roll not only to press water out of the paper but also to smooth it and otherwise affect the textures.

The squeezing of the water out of the paper and out of the felt is determined by two factors, first the amount of pressure per unit of length, and second, the extent of the area between adjacent holes in the suction roll. In the designing of a suction roll for a suction press, it is essential not only to arrange the holes so as to keep the unit pressure as nearly constant as possible, but also to arrange them so as to keep the areas between the holes sufficient to give the required strength.

The shell 3 has surface drilled to provide a multiplicity of holes 7, the upper portion of which holes are rounded, as indicated by the numeral 8, Fig. 4, to provide a smooth surface. The holes are preferably, uniformly distributed throughout the working area of the shell.

Heretofore, the arrangement of the holes was such that in order to provide an operative construction the holes were disposed very close together. This close spacing caused the interior surface of the shell and the packing to become grooved. When the holes were arranged sufficiently far apart to prevent the grooving of the shell or packing, improper suction caused imperfections in the paper passing through the press.

Therefore, in order to provide the suction roll with a perforated surface that would not

cause imperfect paper or grooving of the surface of the shell and of the packing, the holes 7 are arranged spirally around the shell, the centers of the holes being spaced apart a distance more than twice the diameter of the holes.

On the other hand, the centers of the holes are disposed approximately equal distance apart. The arrangement is such that the edges of the holes overlap axially, as well as transversely of the roll. The pitch of the spiral arrangement of the holes around the circumference of the shell is very slight, and, as shown, it may be such that every fifth hole has a center on a line at right angles to the longitudinal axis of the shell. Furthermore, the holes are staggered longitudinally of the shell so that the shell will be provided with perforations at suitable intervals throughout its length.

The holes are so disposed that the inside surface of the shell will present a series of holes across the entire packing every revolution of the shell.

Due to the manner of arranging the holes which I have herein shown and described, the centers of the holes are located about twice the distance apart than has heretofore been the practice. By spacing the holes such a distance apart, I am able to provide a much stronger shell, inasmuch as considerably more metal is left between the holes, yet sufficient suction area is present to properly extract the water from the sheet of paper passing over the suction roll.

One of the advantages in arranging the holes in the manner above described is that none of the interior surface of the suction roll or the packing will become grooved, due to the fact that in the revolution of the shell, each and every part of the packing strip comes in contact with a hole during some part of the revolutions.

I have, for the sake of clearness, shown in Fig. 3, a typical development of a perforated shell constructed according to my invention which I have used in actual practice.

The amount which each hole is shown staggered circumferentially around the shell is such that the centers of the holes of adjacent spiral rows align with each other approximately every two inches. It will be noted that with the arrangement shown the holes of every fourth spiral row align with one another longitudinally of the shell, while of the intermediate spirals between the first and fourth spirals the holes of one are circumferentially staggered one to one side and the other to the other side of the holes of the first and fourth spirals. In directions circumferential to the shell, every hole of each spiral aligns with an opening of adjacent spirals spaced therefrom through five openings. It will be further noted that openings adjacent to one another in a direction either longitudinal to, or circumferential to the shell overlap, with the result that while the openings of the shell are spaced from one another through a distance equal to twice the diameters of the openings the shell is free from areas extending either circumferentially or longitudinally thereon which are without suction openings.

The purpose of the spiral arrangement of holes which I provide is to maintain the aggregate length of contact between the two rolls, substantially constant for all positions thereof so that the pressure applied to the paper and to the felt will remain substantially constant for all positions.

Thus there is a relatively long section of metal between each two adjacent holes for supporting the paper and opposing the pressure of the press roll. At all positions there is a similar favorable condition, that is, there is a relatively large amount of metal to support the paper without, however, losing benefit of the suction at or very close to the line of contact.

According to prior practice, a very different relative arrangement of the holes has been used wherein there were relatively large spaces between the longitudinal rows and relatively small spaces between the holes in each row. The result has been that when a row of holes came under the line of pressure, there was very little metal between the holes to resist the pressure and the paper was marked or otherwise disadvantageously affected.

As the line of pressure shifted to a point between the rows of holes, there was continuous metal for supporting the paper and there was no suction at the line of contact. The result, therefore, was a constant shifting back and forth between a condition of minimum support and maximum suction and a condition of maximum support and no suction. This disadvantageous condition is entirely avoided by my improved construction wherein the amount of suction and the amount of support for the paper remain substantially constant.

One of the essential features of my construction is the amount of overlap so as to provide a substantially uniform aggregate length of contact between the two rolls. If an attempt were made to maintain this overlap and at the same time to use the prior arrangement of holes, the required over-lap might be obtained, but the distance between adjacent holes would be so much reduced as to disastrously weaken the roll.

I claim:—

1. A suction roll comprising a perforated shell and a co-operating suction box, the perforations of the shell being so disposed that the shell throughout the limits of its length defined by the suction box is free from cir-

cumferentially or longitudinally-extending areas having no perforations.

2. A suction roll comprising a perforated shell and a co-operating suction box, adjacent perforations of the shell in directions both longitudinal and circumferential to the shell being offset from one another through a distance less than the diameter of the openings whereby the shell in its perforated area is free from circumferentially or longitudinally-extending areas uninterrupted by perforations.

3. A suction roll comprising a perforated shell and a co-operating suction box, the perforations of the shell being arranged in annular and longitudinal rows, the perforations of said annular and longitudinal rows being so staggered with relation to those of adjacent annular and longitudinal rows that of any group of perforations consisting of a selected perforation and those immediately surrounding the same, no two perforations are disposed in the same annular or longitudinal row.

4. A suction roll comprising a perforated shell and a co-operating suction box, the perforations of the shell being arranged in annular and longitudinal rows, the perforations of said annular and longitudinal rows being so staggered with relation to those of adjacent annular and longitudinal rows that of any group of perforations consisting of a selected perforation and those immediately surrounding the same, no two perforations are disposed in the same annular or longitudinal row, the annular and circumferential rows of openings having their center lines spaced longitudinally and circumferentially of the shell from adjacent similar rows of openings through distances less than the diameters of the openings whereby the shell in its perforated area is free from areas uninterrupted by perforations and extending in directions longitudinally of or circumferential to the shell.

5. A suction roll comprising a perforated shell and a co-operating suction box, the perforations of the shell being uniformly spaced and arranged in annular and longitudinal rows, the perforations of said annular and longitudinal rows being so staggered with relation to those of adjacent annular and longitudinal rows that of any group of perforations consisting of a selected perforation and those immediately surrounding the same, no two perforations are disposed in the same annular or longitudinal row.

6. A suction roll comprising a perforated shell and a co-operating suction box, the perforations of the shell being spaced from one another through a distance at least twice the diameter of the openings and being arranged in longitudinally and circumferentially-extending rows, each of said longitudinally and circumferentially-extending rows being spaced from adjacent similar rows through a distance less than the diameter of the openings.

7. A perforated suction roll shell having its perforations equally spaced with the distance between the centers of the perforations more than twice the diameter thereof, said openings being arranged in adjacent spirals so staggered with relation to one another that a portion of the openings is in the line of contact of the suction roll at every angle of the revolution thereof.

GEORGE D. KILBERRY.