No. 631,106. Patented Aug. 15, 1899.

A. CROCKER & J. E. MORSE.

ROLL.

(Application filed Nov. 2, 1898.)

(No Model.)

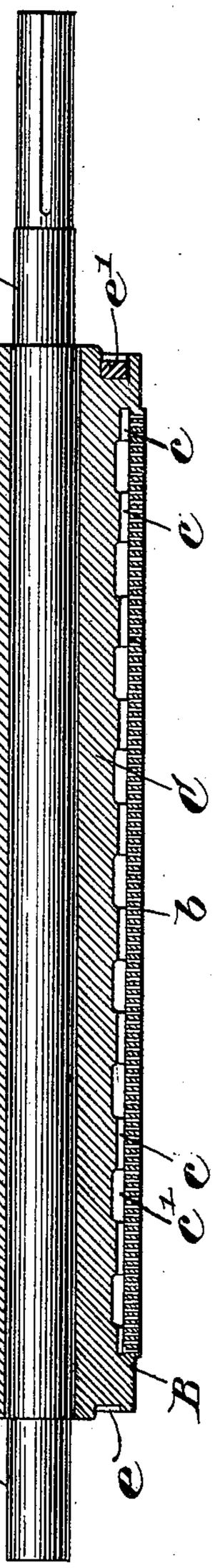

Fig. 2.

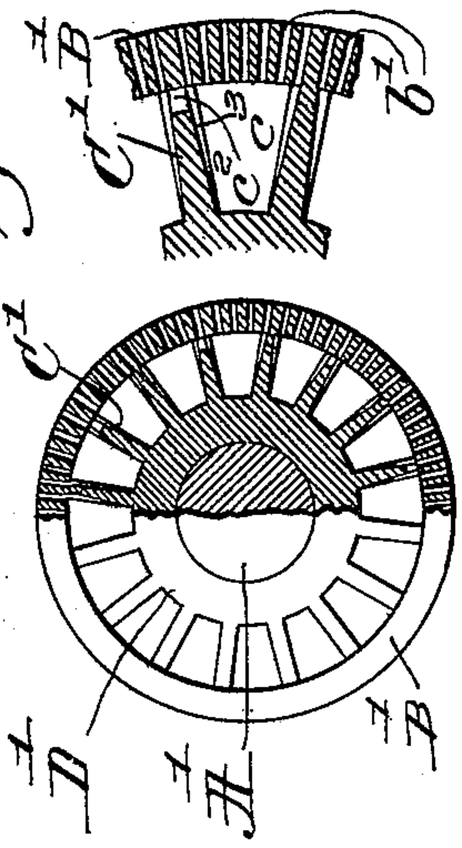

Fig. 3.

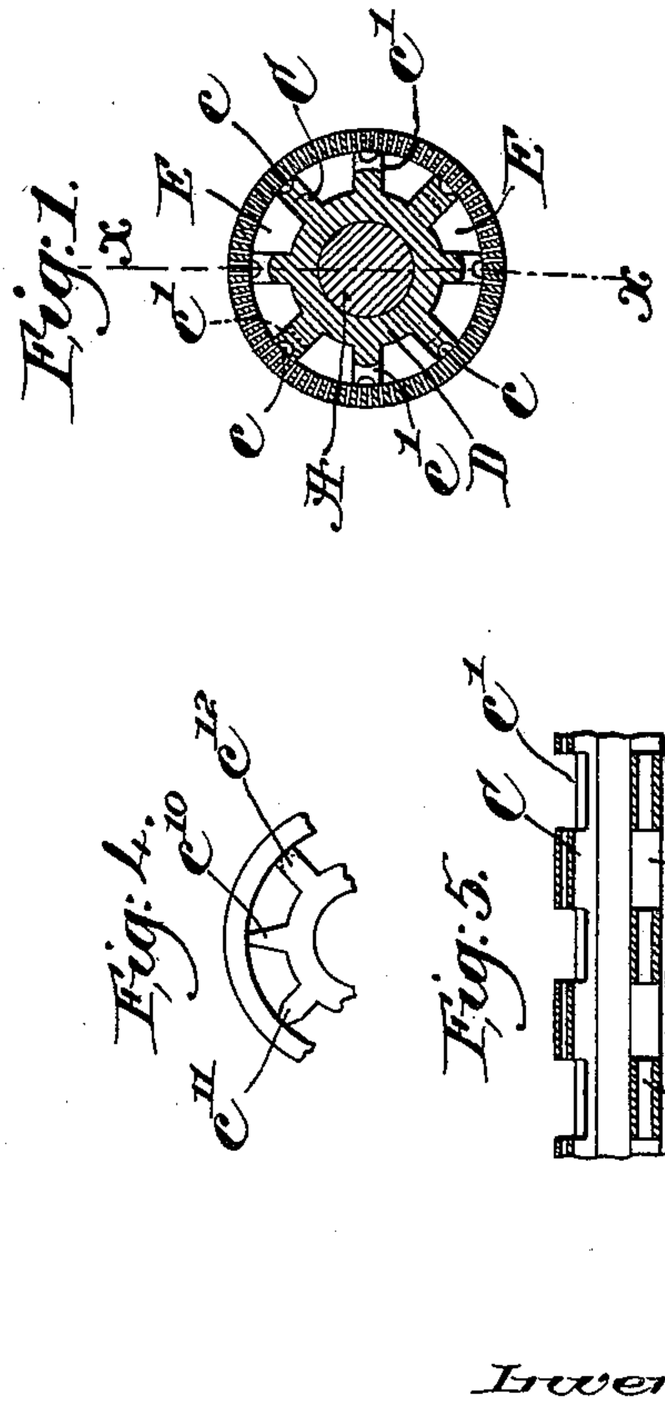

Fig. 1.

Fig. 4.

Fig. 5.

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ROLL.

SPECIFICATION forming part of Letters Patent No. 631,106, dated August 15, 1899.

Application filed November 2, 1898. Serial No. 695,256. (No model.)

To all whom it may concern:

Be it known that we, ADAMS CROCKER and JAMES E. MORSE, of Fitchburg, county of Worcester, State of Massachusetts, have invented an Improvement in Rolls, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

In pulp-making machines, particularly of the class known as "wet" machines, perforated suction-rolls have been used in order to pick up the wet layer of pulp or fiber from the cylinder-mold and deliver it to the press-roll, the suction acting also to extract from the layer a considerable degree of its moisture before it is subjected to the squeezing action of the two rolls. In adopting a perforated roll it was found that the strength of the roll was considerably weakened, and accordingly a corresponding diminution was made in the degree of pressure between the couch and the press roll. Recently a demand has arisen for a product which requires not only the use of the suction-roll, but a higher degree of pressure than can be obtained with the perforated rolls now in use; and it is the object of our invention to provide a perforated roll in which there will be abundant interior space to receive and conduct away the fluid extracted from the layer of pulp through the peripheral apertures and which at the same time will stand up under an extremely heavy pressure without any breakage, deflection, or impairment of its working qualities.

In constructing perforated couch-rolls hitherto it has been a common practice to mount a series of separated spiders upon a shaft and then to shrink the perforated jacket upon the radial arms of these spiders, and with the well-known difficulty of heating the jacket uniformly throughout its length, added to the frequent variations in the length of the spider-arms, such a structural weakness exists that rolls made in this manner have given away under the strains to which they are thereafter subjected. In constructing our improved roll we make use of longitudinal web-like ribs resting at their inner portions against the shaft and at their outer portions supporting the cylindrical working surface of the roll. These ribs may be provided with longitudinal channels adjacent their region of union with said cylindrical portion of the roll, and preferably have also, respectively, series of transverse apertures preferably adjacent the said region of union and intersecting or in communication with said longitudinal channels, if such are used, so that the fluid drawn in through the peripheral apertures will find a ready passage to the main spaces separating the ribs, these apertures being preferably staggered relatively to the series in respectively adjacent ribs. Such a combination of channels and apertures is especially applicable where the cylindrical working surface is of considerable thickness.

While our improved roll is particularly adapted for use as a suction couch-roll in machines of the class to which reference has already been made, we wish it understood that we contemplate its utilization in any class of work to which it may be adapted by reason of its qualities of combined lightness and strength and whether the cylindrical working surface is apertured or solid.

The various features of our invention will be fully illustrated and described in the accompanying drawings and specification and set forth in the claims.

In the drawings, Figure 1 is a transverse vertical section of a roll in the construction of which our improvements have been embodied. Fig. 2 is a longitudinal section on the line $x\,x$, Fig. 1. Fig. 3 is an end elevation, partly in section and on an enlarged scale, of a modified form of webs. Fig. 3^a is a detail view, on an enlarged scale, of a detached portion of the cylindrical working surface and supporting-ribs. Fig. 4 is a detail view in which are grouped webs of several modified forms; and Fig. 5 is a detail view, on an enlarged scale, of adjacent webs, illustrating the staggered apertures, to reveal which the cylindrical working surface is removed.

In the construction selected for illustration and description as a convenient form by which to explain the novel features of our invention, A designates any usual or suitable shaft or like axial support for the roll, preferably of wrought metal.

B designates a cylindrical working surface which may be of usual or suitable construction, preferably formed integral with the

parts of the roll and in the instance illustrated shown as provided with a multiplicity of peripheral apertures or perforations *b*.

C designates the respective members of a series of web-like ribs arranged intermediate the cylindrical working surface and axial support longitudinally of the roll and adapted to derive support from the latter and in their turn support the cylindrical working surface. Some variation in the construction of these ribs may be made, but we prefer to form them integral with the cylindrical working surface and to unite them at their bases by an axially-arranged hub or support D, which under favorable circumstances may constitute the axial support or may and preferably does, as illustrated, form part of the axial support, acting in this instance virtually as a sleeve seated upon the shaft A, as will be appreciated readily by those skilled in the art. Such an arrangement of longitudinal web-like members will afford great strength with lightness, having the power to resist in a most effective manner both torsional strains and deflecting forces normal to the periphery. These parts will preferably be integral and of cast metal.

Where a perforated cylindrical working surface is utilized for purposes of suction or in other uses, communication with the body-chambers intermediate the ribs should be provided for, and chiefly to this end, although lightness with strength is also furthered by the construction we are about to describe, we have represented the ribs as diminished in thickness of material by being channeled or provided with longitudinal passages *c* adjacent their region of union with the cylindrical working surface and in communication with the peripheral apertures of the latter. Intermediate these channels or passages and the body-chambers E are transverse body-apertures *c'* in the ribs, each aperture being in communication with both the longitudinal channel and the body-chambers and preferably intersecting the channel directly adjacent the cylindrical working surface, as illustrated.

In operation the moisture entering through the peripheral apertures of the cylindrical working surface, which apertures are shown as unduly enlarged for the sake of clearness, will pass into the channels *c* and thence through the communicating body-apertures *c'* of the ribs into the body-chambers E of the roll, whence the moisture may be withdrawn in any suitable manner, as through an opening or openings *e* at the roll end. The other end of the roll may be closed, if desired, by a suitable closure *e'*.

Of course where the body-apertures *c'* are directly adjacent the cylindrical working surface the moisture from certain of the peripheral apertures will pass directly into the body-apertures of the rib, as will be readily understood from the drawings.

The number of body-apertures in the ribs and their relation to one another will be dependent in some measure upon the number of ribs, which may be varied from that shown in Fig. 1, although eight is a convenient number for strength with lightness; but we deem it important, although not absolutely essential, that the apertures shall be staggered relatively to the series in respectively adjacent ribs, as shown clearly in Fig. 5.

In Fig. 3 we have illustrated a roll in which the number of webs and their proportions and form have been modified, the webs being diminished in thickness adjacent their region of union with the cylindrical working surface by a taper, as seen more clearly in Fig. 3ª at c^3, while if the roll-surface is unperforated near its ends, as in Fig. 1, the ribs may under this portion be of uniform thickness between the support and surface, as indicated by the ribs shown in end elevation in Fig. 3. The reference-letter c^2 designates one of a series of body-apertures with which the ribs C' may be provided. When webs diminished thus in thickness radially are used, the longitudinal channels may be omitted without disadvantage, as we have found in practice, and, furthermore, the taper may be extended from end to end of the webs, as the rib shown at c^{10}, Fig. 4, or instead of tapering uniformly from its inner to its outer portion may have a short taper for a part or the whole of its length, as in the ribs c^{11} c^{12}, respectively, Fig. 4.

The construction and arrangement of parts may be varied considerably within the spirit of our invention from the specific form illustrated, and we do not limit ourselves otherwise than as set forth in the claims.

Having described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A roll of the class described; said roll comprising a cylindrical working surface; an axially-arranged support, and a plurality of longitudinal, web-like ribs intermediate said support and cylindrical surface and to support the latter; said ribs being provided respectively with series of transverse apertures adjacent their region of union with said cylindrical working surface; said apertures being staggered relatively to the series in respectively adjacent ribs.

2. A roll of the class described, said roll comprising a foraminous, cylindrical, working surface; an axially-arranged support; and a plurality of longitudinal web-like ribs intermediate said shaft and cylindrical working surface; said ribs having longitudinal channels or passages at their region of union with said cylindrical working surface, and transverse body-apertures; said peripheral perforations, longitudinal channels and body-apertures being in communication with each other and with the body-chambers of the roll, affording means for the exit of the fluid entering said roll peripherally.

3. A couch-roll, comprising a foraminous jacket; an axial support; and intermediate

longitudinal ribs provided with longitudinal channels in communication with the perforations of said jacket; said ribs having also, respectively, series of transverse body-apertures in communication with said channels and the body-chambers of said roll, said apertures being staggered relatively to the series in respectively adjacent ribs; substantially as described.

4. A roll for paper-making machinery or the like; said roll comprising a cylindrical working surface; an uninterrupted, axially-arranged cylindrical support extending from end to end of said working surface; and a plurality of radially-disposed web-like ribs substantially coextensive in length with said working surface and support and arranged therebetween; said cylindrical working surface, ribs and support being integral.

5. A roll for paper-making machinery or the like; said roll comprising a cylindrical working surface; an axially-arranged support; and a plurality of radially-disposed web-like ribs substantially coextensive in length with said working surface and interposed between the same and said support, with longitudinal spaces between said ribs and coextensive with said roll; said cylindrical working surface, ribs and support being integral; and means to close said spaces.

6. A roll for paper-making machinery or the like; said roll comprising a cylindrical working surface; a shaft of wrought metal; an axially-arranged sleeve or support; and a plurality of radially-disposed web-like ribs substantially coextensive in length with said working surface and interposed between the same and said sleeve; said cylindrical working surface, ribs and sleeve being integral, of cast metal, formed upon, and in intimate union with, said shaft.

7. In a roll for paper-making machinery or the like; a cylindrical working surface; an axially-arranged support; and means for supporting said cylindrical working surface, said means comprising a plurality of radially-disposed, web-like ribs substantially coextensive in length with said working surface and interposed between the latter and said support, said ribs having their material diminished in thickness adjacent their region of union with said working surface.

8. In a roll of the class described; a cylindrical working surface; an axially-arranged support; and longitudinal web-like ribs intermediate said surface and said support, each rib being sustained uniformly throughout its entire length by said support and coextensive with said working surface; and longitudinal spaces between, and coextensive in length with said ribs.

9. A roll of the class described; comprising a foraminous cylindrical working surface; an axially-arranged cylindrical support of uniform thickness from end to end; and longitudinal, web-like ribs intermediate said support and surface, said ribs having transverse body-apertures.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ADAMS CROCKER.
JAMES E. MORSE.

Witnesses:
WALTER G. COREY,
FRANK H. BROWN.