(Model.)

D. R. BURNS.

PROCESS OF AND MACHINE FOR REDUCING FIBER IN THE MANUFACTURE OF PAPER, &c.

No. 259,974. Patented June 20, 1882.

Fig. 1.

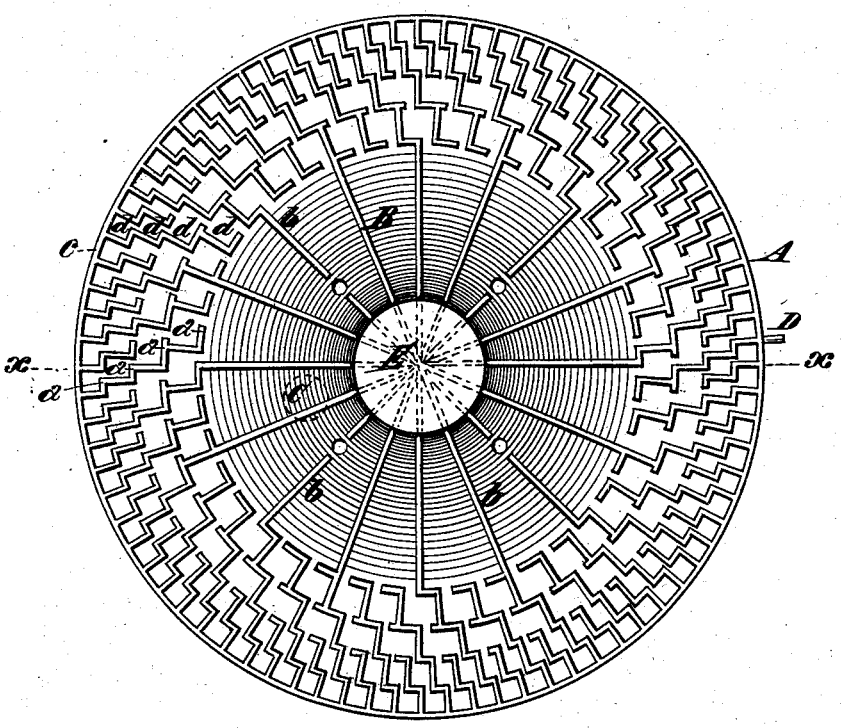
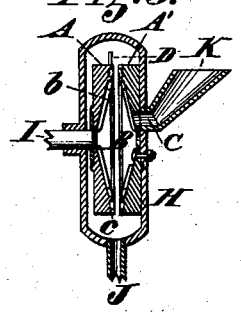


Fig. 2.

Fig. 3.



Attest
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UNITED STATES PATENT OFFICE.

DANIEL R. BURNS, OF DAYTON, OHIO, ASSIGNOR OF ONE-HALF TO FRANCIS J. McCORMICK, OF SAME PLACE.

PROCESS OF AND MACHINE FOR REDUCING FIBERS IN THE MANUFACTURE OF PAPER, &c.

SPECIFICATION forming part of Letters Patent No. 259,974, dated June 20, 1882.

Application filed May 20, 1882. (Model.)

To all whom it may concern:

Be it known that I, DANIEL R. BURNS, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Processes of and Machines for Reducing Fibers in the Manufacture of Paper, &c.; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in the manufacture of paper, and the object is to produce apparatus or machinery by which the material to be reduced into pulp preserves the strength of the fiber, and to accomplish this it is necessary to pull or tear the fibrous material asunder without chopping or cutting it.

The invention consists, first, in the process or method of feeding the material into a hopper having the feed-spout arranged eccentrically to a pair of grinding-disks similar to those shown in Letters Patent No. 253,814, granted to me February 14, 1882. This arrangement of the feed-spout is a very important feature of my invention, as the material is immediately carried outward and is torn into shreds, whereas by a central feed the tendency is to bunch and revolve the material in the center without tearing it or passing it toward the periphery of the disks. These disks are provided with a peculiar dress, consisting of a series of radial flanges or ribs on the inner portion of the faces of the disks, which intersect a series of broken annular flanges, between which, again, are formed a series of zigzag, corrugated, or serrated flanges and passages, so as to form a number of cutting-edges, and at the same time to check a too rapid radial discharge of the material fed in between the disks. The faces of the reducing-flanges on the disks are horizontal, or nearly so, and lie in parallel planes.

Another feature of my invention consists in providing on the periphery of each disk an annular flange or rib having narrow horizontal or plane faces, between which flanges the material passes for the finishing part of the reducing process as the material is discharged from the mill.

Another feature of my invention consists in the process of making paper-pulp from rags, wood, cotton-seed hulls, or similar articles without cooking them, all of which will be more fully described hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan view of one of the reducing-disks. Fig. 2 is a vertical cross-section on line *x x*. Fig. 3 is a vertical central section, showing the disks set in a curb or housing.

In the drawings, A A′ represent the reducing-disks, one of which may be stationary and the other revolve with the shaft I, upon which it is secured and properly journaled in the curb or housing H. The disk A′ is secured to the curb H by bolts or in any other suitable manner.

The face B of the disks is provided with the radial flanges or ribs *b*, extending from the center or eye of the disk, intersecting an annular series of segmental ribs, *a*. The central portion of the face is made concave, so as to allow the mill to be readily fed. The ribs *b* tear, pull, and partially reduce the material as it passes between their faces outwardly toward the annular reducing-rib. In the drawings four annular series of ribs *a* are shown, the faces of which are horizontal, or nearly so, and slightly inclined inward, as shown in Fig. 2, so that the ribs *a* of the two reducing-disks, when their faces are placed opposite to each other, will gradually approach each other from the inner series to the periphery.

On the outer periphery of each disk is represented an annular rib, *c*, between which the material passes for the finishing part of the reducing process as the material is discharged from the mill.

Between the inner annular rib and the rib at the periphery are arranged a series of zigzag, corrugated, serrated, or other shaped ribs, *d*, with small passages or furrows leading from the space between the ribs *b* to the periphery of the disk. These ribs and furrows retard the material and prevent its too rapid outward discharge while it is subjected to the action of the reducing-ribs.

The hopper K has a feed-spout, C, which is arranged eccentrically to the central axis of the two disks, so that the material is readily

taken up and carried outwardly between them, and the fibers are thus better separated and torn.

The material is prevented from clogging or choking the feed-opening, which is the case when it is placed on the central axis, as in my former patent, referred to above.

On the periphery is placed a finger or scraper, I, which assists in discharging the lint out of the curb and through the discharge-spout J.

The disks are preferably made of steel or cast-iron, although other suitable material may be used. The dress may be made of any suitable configuration by which a series of cutting-edges are produced, and I do not limit myself to the dress shown in the drawings. The disks should also be so arranged that one of them can be adjusted by screws or equivalent means, by which the fineness of the material can be regulated. The disks should be turned off true.

An automatic feed mechanism may be applied, if desired. The radial ribs *b* may extend across the entire central part of the disks, if desired, as shown in dotted lines in Fig. 1.

The pulp produced by my mill is superior to that of any other known to me, as the material is caught between the flat faces of the ribs, which grip, tear, and separate the fibers without cutting or chopping them up, and thus produce a very strong fibrous pulp, and therefore much tougher paper. It can be used for grinding rags, straw, grain, or seed of all kinds, for granulating tobacco or any fibrous or stringy material, and for ginning cotton, &c. It is not liable to get out of order, can be made at a moderate expense; the faces and edges will wear a long time without wearing out, and by placing the feed-opening on one side of the central axis of the disks the material is much better and more easily taken up, carried toward the periphery, and reduced to pulp.

Having thus described my invention what I claim, and desire to secure by Letters Patent, is—

1. The process of manufacturing paper, which consists in feeding the material through an eccentrically-arranged feed-opening between two disks having cutting-ribs, by which it is carried outwardly and is torn and separated into fibers, and is finally reduced between a peripheral rib, substantially as and for the purpose set forth.

2. A mill for reducing rags and fibrous substances, consisting essentially of two disks having concave faces with a series of radial annular and irregular ribs, with flat faces to form the dress of the disks, substantially as specified.

3. A mill for reducing fibrous substances, consisting of two disks having a series of flat-faced ribs which form cutting-edges, and a concave central part, gradually diminishing in depth toward the periphery, substantially as specified.

4. A mill for reducing substances, consisting of two disks having a series of ribs, as shown, to form cutting-edges, and a central concave part, in combination with a feed-opening arranged eccentrically to the central axis, substantially as and for the purpose described.

5. A reducing-mill for fibrous substances, consisting of two disks having a central concave part with radial ribs and their faces gradually diminishing in depth toward the periphery and provided with a series of cutting-edges and furrows near the periphery, substantially as shown and specified.

6. A mill for reducing fibrous substances, consisting of the disks A A′, having a concave face gradually diminishing toward the periphery and provided with a series of radial annular and segmental flat-faced ribs, all arranged, as shown, to form cutting-edges, substantially as and for the purpose set forth.

7. A reducing-mill having disks A A′, provided with a series of radial ribs, *b*, intersecting or radial ribs *a*, and irregular passages *d*, formed between them, all substantially as shown and specified.

8. A reducing-mill having disks A A′, provided with a series of radial ribs, *b*, annular ribs *a*, and irregular passages *d*, one of the disks made stationary and the other revolving, and the feed-orifice arranged eccentrically, substantially as set forth.

9. The process of making paper from rags or equivalent material by reducing it in a mill in a dry state, as herein described, to a fibrous condition and converting the lint into pulp and finishing it by the usual and wet cardboard mechanism, substantially as herein set forth.

In testimony whereof I hereto affix my signature in presence of two witnesses.

D. R. BURNS.

Witnesses:
FRANCIS J. MCCORMICK,
A. L. JACKSON.