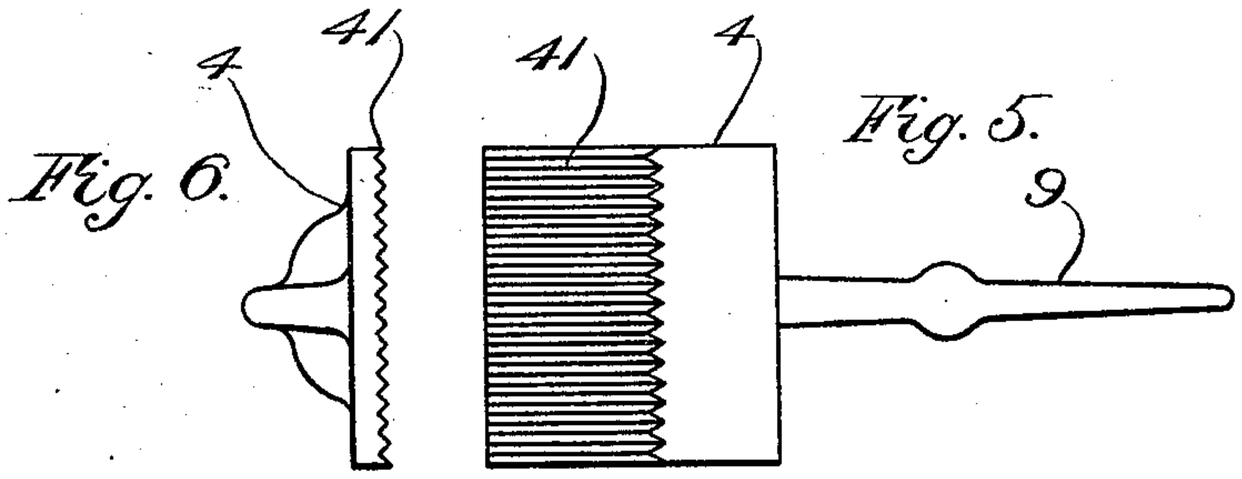
(No Model.) 2 Sheets—Sheet 1.

A. T. ATHERTON.

MACHINE FOR WORKING FIBROUS MATERIALS.

No. 587,085. Patented July 27, 1897.



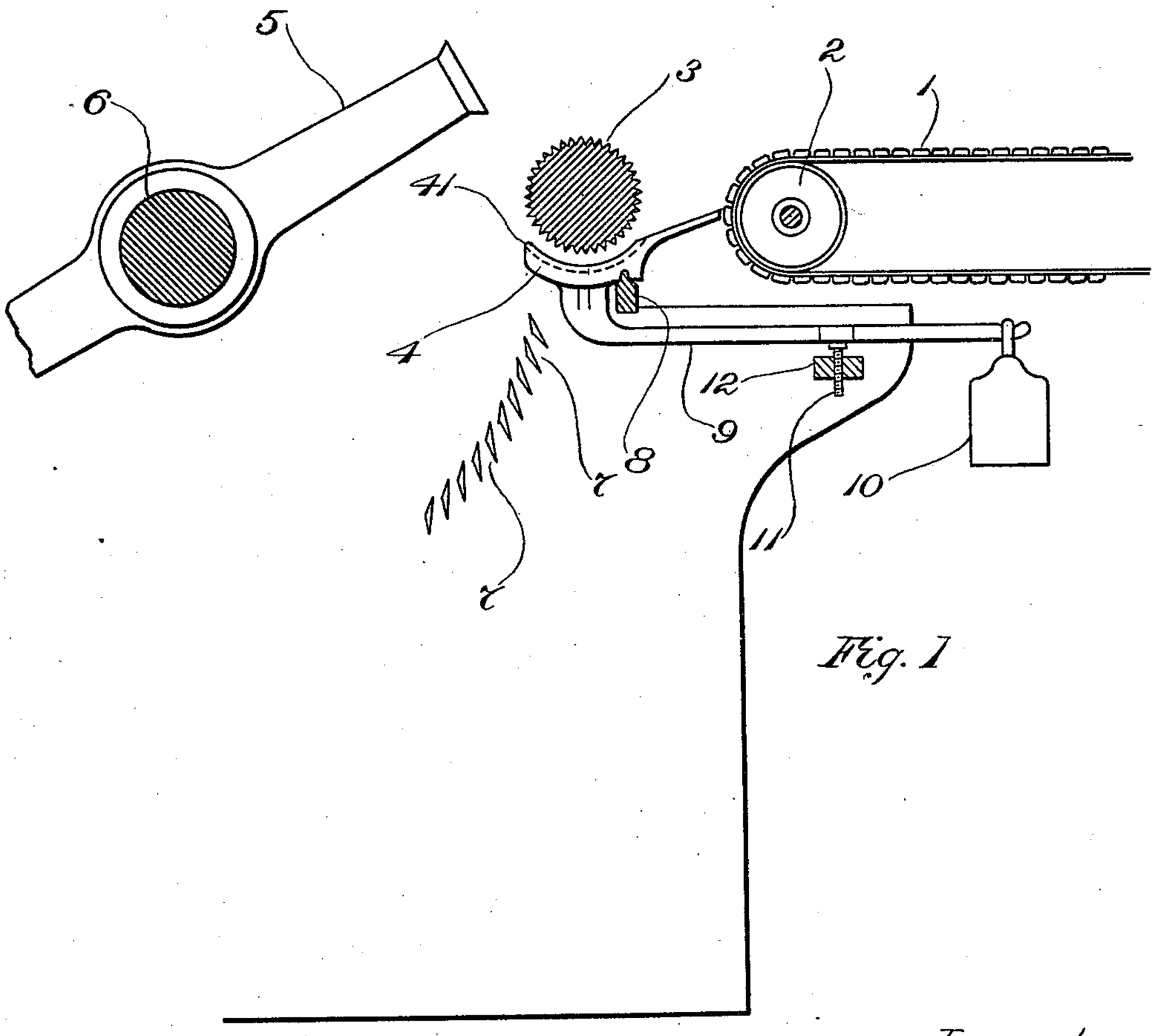


Fig. 1

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2

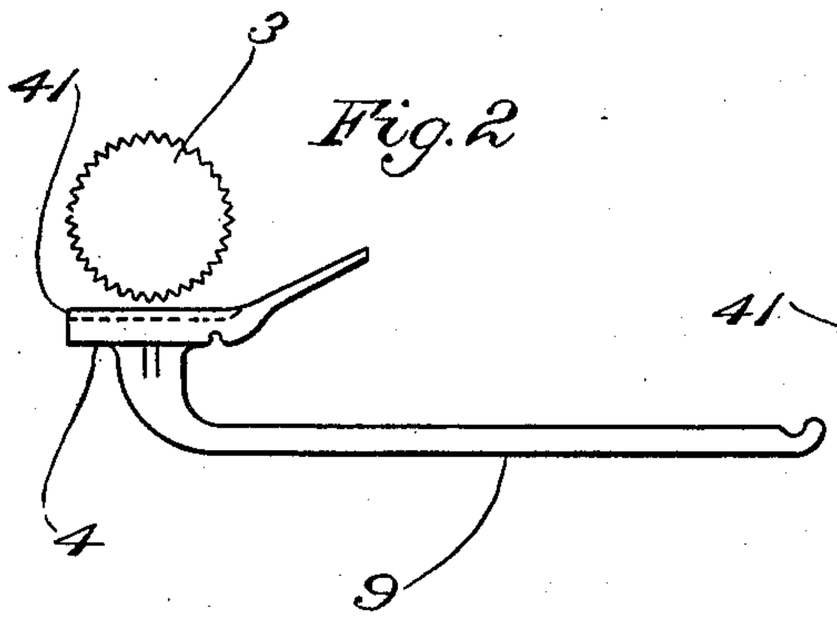
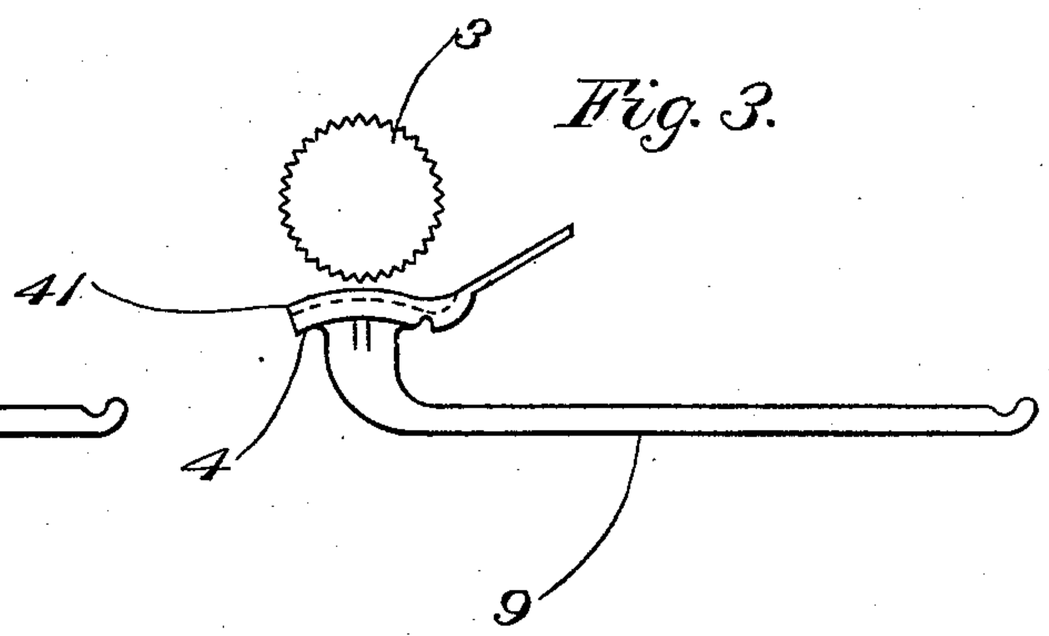


Fig. 3.



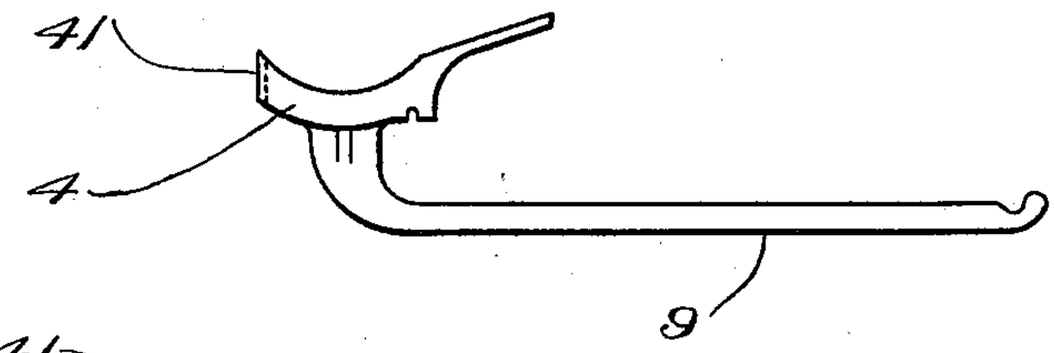


Fig. 7.

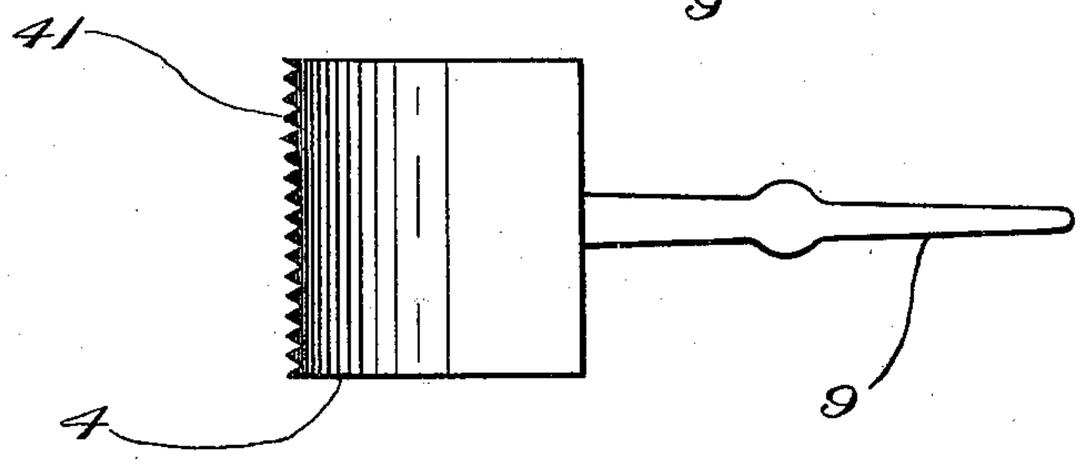


Fig. 8.

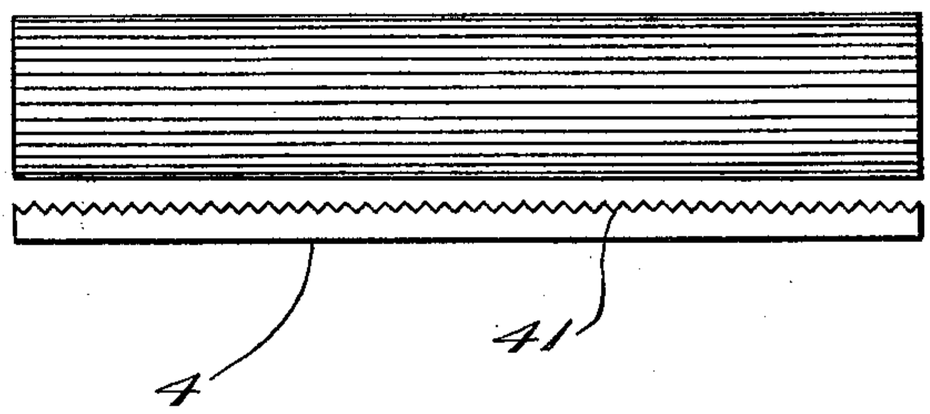


Fig. 4.

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UNITED STATES PATENT OFFICE.

ABEL T. ATHERTON, OF WARWICK, RHODE ISLAND.

MACHINE FOR WORKING FIBROUS MATERIALS.

SPECIFICATION forming part of Letters Patent No. 587,085, dated July 27, 1897.

Application filed February 3, 1897. Serial No. 621,764. (No model.)

To all whom it may concern:

Be it known that I, ABEL T. ATHERTON, a citizen of the United States, residing at Warwick, in the county of Kent and State of Rhode Island, have invented certain new and useful Improvements in Machines for Working Fibrous Materials, of which the following is a specification, reference being had therein to the accompanying drawings.

It is well understood by those who are acquainted with the working of machines for preparing fibrous materials to be spun that an effectual loosening and opening up of the fibrous material are necessary to be effected in such machines in order to provide for the removal of foreign substances. The thoroughness with which such removal may be effected is dependent largely, more particularly in the preliminary machines—such, for instance, as openers—upon the extent to which the fibrous material is loosened up as it is fed into such machines and subjected to the action thereof. One of the chief difficulties which are experienced in the handling of cotton fiber is in connection with the removal of the so-called "leaf" which is found contained in the cotton as the latter reaches the manufacturer. Openers and the like as now constructed and in use are quite effective for the removal of sand and other heavy impurities, but do not act satisfactorily so far as concerns the separation and removal of the leaf. The reason of this is that in such machines the lumpy or matted portions of cotton are not properly opened or loosened and the fibers are not separated from one another sufficiently to free the particles of leaf which are contained in such portions of the fibrous material. Hence it follows that a comparatively large proportion of leaf still remains among the fibers as they leave the machine.

My invention has for its special aim to enable fibrous material when subjected to the action of machines for preparing fibrous materials to be spun to be loosened and opened up more completely and effectually than heretofore has been possible in the like machines and without injury to the staple.

The invention is applicable to any of the different machines which are employed for the preparatory treatment of fibrous material. In the present case I have illustrated the invention as applied to the machine which is known as an "opener" and shall thus describe it. There is an advantage in making application of the invention to this machine, inasmuch as the earlier the stage in the process of treatment at which the fibrous material is opened and cleansed effectually the smaller is the proportion of impurities needing to be cared for and removed in the subsequent steps of the process and the less severe is the treatment of the fibers in such subsequent step.

In machines for preparing fibrous material to be spun it is customary to employ at the feed end of a given machine either a pair of feed-rolls or a feed-roll and a feed plate or shell located adjacent to said feed-roll, the fibrous material in this last case, which is supplied by the usual feed-apron passing between the feed-roll and feed plate or shell, the said material being compressed between the feed-roll and the surface of the feed plate or shell and being fed into the machine over the said surface of the said feed plate or shell by the rotation of the feed-roll.

So far as I am aware the feed-plates heretofore actually employed in practice have the forward edges thereof—that is to say, the edges which are next adjacent to the beaters—made plain. There has been a failure to attain the best result in the case of the use of the devices which have just been described, inasmuch as the plain edge of the feed-plate permits the fibrous material passing over the same to be drawn into the machine in bunches, which is very objectionable, since it results in foreign matters remaining embedded in the fibrous material and carried onward through the machine to the detriment of the product.

The chief object of my invention is to obviate this defect and disadvantage—in other words, to provide means whereby to insure that fibrous material on leaving the feed-roll shall be more effectually loosened by the action of the beater than heretofore, and the foreign substances shall be thoroughly loosened, so as to cause them to be separated from the fibrous material.

My invention relates particularly to the form and construction of the feed plate or shell, and, briefly stated, consists in so form-

ing and constructing the said feed plate or shell that at the delivery edge thereof—that is to say, at the edge thereof at which the material leaves the feed plate or shell on its way into the machine—there shall be slight serrations, waves, or undulations presenting slight ridges alternating with shallow depressions.

It consists also in forming the surface of the said feed plate or shell which is opposed to the feed-roll serrated, waved, or undulating, the serrations or ridges and depressions extending at right angles to the length of the feed-roll. This latter feature of the construction enables the fibrous material to be better gripped and held between the feed-roll and the feed plate or shell.

The invention will be described first with reference to the accompanying drawings, in which latter I have represented the best embodiments thereof which I have yet contrived, and afterward will be particularly pointed out, and distinctly defined in the claims at the close of this specification.

Figure 1 of the drawings is a view in longitudinal section of sufficient of a cotton-opener having my invention applied thereto to illustrate clearly the nature and relations of the said invention. Figs. 2 and 3 are detail views showing modifications. Fig. 4 is a view looking from the left-hand side in Fig. 1, showing the use of a single long feed-plate. Figs. 5 and 6 are plan and end views of one section of a sectional feed-plate, the latter being of the flat form which is represented in side elevation in Fig. 2. Figs. 7 and 8 are side and plan views of one section of a concave sectional feed-plate.

Referring to Fig. 1, 1 designates the usual feed-apron of a cotton-opener. 2 is one of the rollers around which the said feed-apron is passed.

3 is the feed-roll, to which is delivered the cotton that is carried forward by the feed-apron. 4 is a feed-plate, between which and the feed-roll the said cotton is compressed.

5 is the usual beater.

6 is the beater-shaft.

7 7 are the usual grid-bars.

8 is the fulcrum-bar on which the feed-plate is mounted pivotally.

9 is an arm projecting from the feed-plate 4. 10 is a weight that is hung upon the said arm 9. 11 is a set-screw to limit the extent of movement of the feed-plate under the action of the said weight 10 whereby to prevent the said feed-plate from coming in contact with the feed-roll.

The feed-plate 4 may extend the entire length of the feed-roll 3, as in Fig. 4, in which case it will be supported at each end and adjusted relatively to the feed-roll in well-known manner, or may be composed of a number of short sections, such as those which are represented in Figs. 5, 6, and 8.

All of the foregoing parts are or may be constructed, arranged, and operated in any known or suitable manner, save as hereinafter pointed out with reference to the feed-plate 4.

The serrations, waves, or undulations which I form or provide on the feed plate or shell 4 in accordance with my present invention are designated 41. These have but small height and the surface on which they are formed or provided does not depart materially from a continuous plane. In practice heretofore the vertical distance from the top of a rib or ridge to the bottom of an adjacent flute or depression has been made by me an eighth of an inch in some cases and a sixteenth of an inch in others, and there have been small variations from these measurements. In all cases, however, I contemplate that the serrations, waves, or undulations shall be comparatively shallow or slight and shall be at or extended to the forward upper or delivery edge of the plate.

Figs. 7 and 8 of the drawings show the uneven surface extending vertically downward from the working edge along the forward face of the feed plate or shell next to the beater. Figs. 1, 2, 3, 5, and 6, however, show the upper surface of the feed plate or shell made uneven and the ribs or ridges and flutes or depressions extending from the forward or delivery edge transversely across the feed plate or shell—that is, in the direction of the line of feed.

In operation the fibrous material passing between the feed-roll 3 and the feed plate or shell and moved forward over the said feed plate or shell by the rotation of the feed-roll as fast as it reaches the forward or delivery edge of the said feed plate or shell is struck and detached by the blades of the beater. The blows which are given by the said blades when they encounter the fibrous material projecting over the forward or delivery edge of the feed plate or shell strike the fibrous material upon or against the uneven surface or edge of the feed plate or shell, which I have found in practice gives highly-improved results in effectually opening and loosening the fibrous material, including all lumps and matted portions.

By enabling the beater to open up and loosen the lumps and matted places in the fibrous material more completely than heretofore I am enabled to remove in the opener an increased proportion of the leaf. In like manner, when the invention is applied to other machines than openers a similar improved result is secured.

In Figs. 1, 2, 3, 5, and 6 the ribs or ridges and flutes or depressions extend from the forward upper or delivery edge of the feed-plate beneath the feed-roll, so that the fibrous material is compressed by the feed-roll against the uneven or serrated surface of the feed plate or shell. The feed-roll acts to force certain portions of the fibrous material into the depressions or flutes, improving the firmness with which the fibrous material is grasped and held to the extent of the frictional hold

against the sides of the said flutes or depressions. Furthermore, the forcing of the said portions of the fibrous material into the depressions or flutes has the same effect upon the lap or sheet of fibrous material passing between the feed-roll and the feed plate or shell as a lateral pull or strain would have, it acting, as it were, to stretch the said lap or sheet laterally. This facilitates the opening or loosening.

It has been proposed heretofore to employ at the forward or delivery edge of the feed plate or shell a blade placed in an upright or inclined position and having the upper edge thereof cut into the form of teeth, the result being intended to be that by the action of a toothed roll or cylinder or the like the fibrous material shall be forced upon the said teeth and combed through the same. It has been proposed also to use a series of upwardly-projecting teeth at the same edge of a feed plate or shell and with the same object in view. So far as I am aware neither of these arrangements has gone into practical use. They differ radically in principle from my present invention and present features and disadvantages which I have studied to avoid. In the operation of such arrangements the fibrous material will be caught and held by the teeth and crowded down into the deep openings or intervals between them, this resulting not only in much breaking of fiber, but in forming the fibrous material into tufts and bunches which will be dragged out and carried forward through the machine in an unopened condition. With my present invention the aim is not to provide teeth on the feed plate or shell, but to so construct the latter as to produce the unevenness which facilitates the opening and loosening hereinbefore referred to while still affording a substantially uniform support and practically unobstructed passage to the sheet or lap of fibrous material across the machine at the forward or delivery edge of the feed plate or shell.

By "serrated" herein I wish it to be understood that I do not intend to include the use of teeth.

The upper surface of the feed-plate may be concaved to receive the feed-roll, as in Figs. 1, 7, and 8, or it may be flat, as in Figs. 2, 5, and 6, or convexed, as in Fig. 3.

I claim as my invention—

1. The combination with the feed-roll of a machine for preparing fibrous materials, and the beater or corresponding part in such machine, of the feed-plate between which and the said feed-roll the fibrous material is nipped and formed with slight ribs or ridges and shallow flutes or depressions extending to and producing fine serrations in the forward upper or delivery edge of the said feed-plate.

2. The combination with the feed-roll of a machine for preparing fibrous materials, and the beater or corresponding part in such machine, of the feed-plate between which and the said feed-roll the fibrous material is nipped and formed with slight or fine serrations in the forward upper or delivery edge thereof.

3. The combination with the feed-roll of a machine for preparing fibrous materials, and the beater or corresponding part in such machine, of the feed-plate between which and the said feed-roll the fibrous material is nipped and having the surface thereof which coacts with the said feed-roll formed with alternating elevations and depressions extending in the direction of the line of feed.

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

ABEL T. ATHERTON.

Witnesses:

FRED A. WILDE,

CHAS. M. READ.