(No Model.) 2 Sheets—Sheet 1.

J. J. MANNING.

BEATING AND REFINING ENGINE FOR PAPER PULP.

No. 282,098. Patented July 31, 1883.

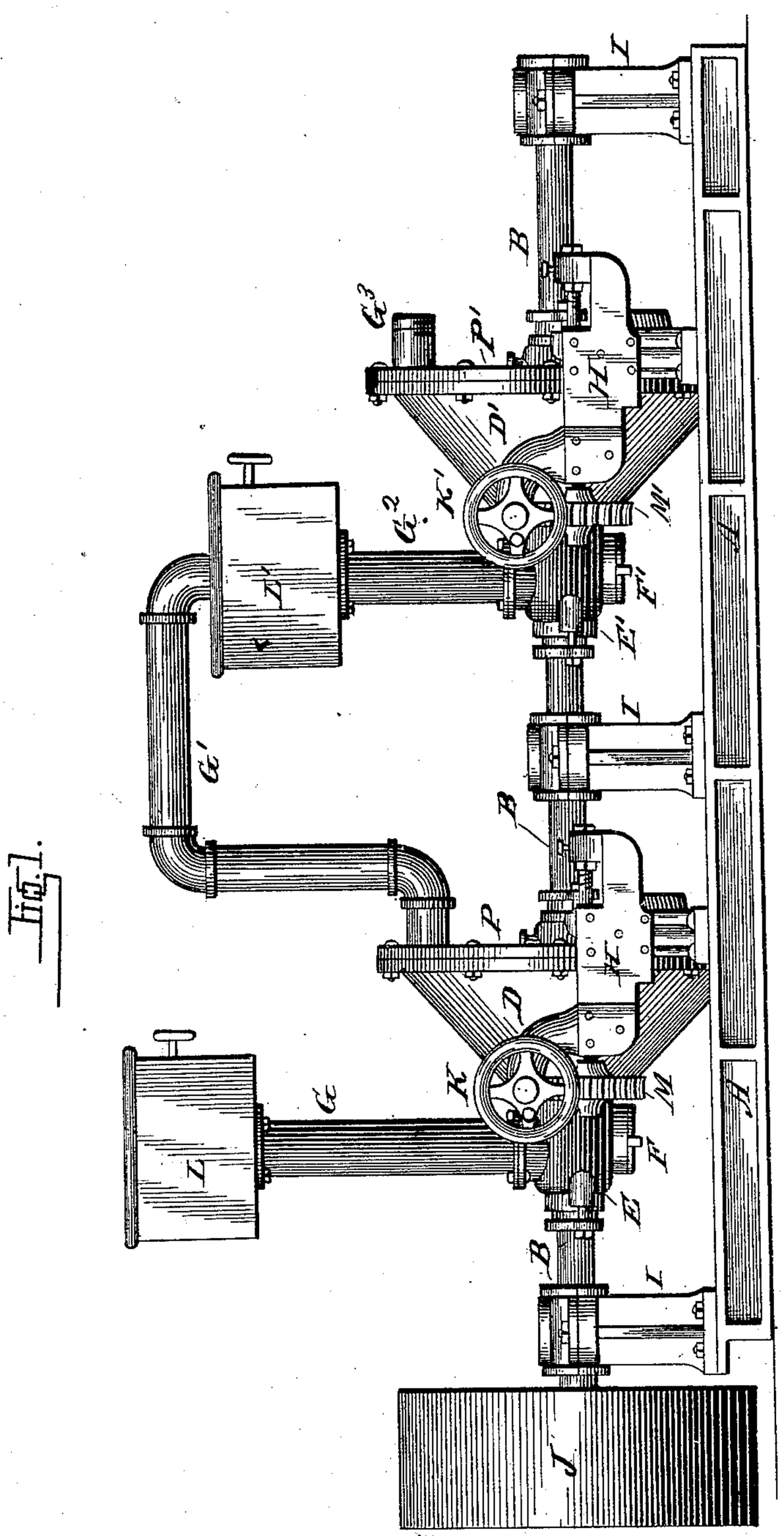

Fig. 1.

WITNESSES:

Fred. L. Dieterich.

Arthur L. Morrell.

INVENTOR.

John J. Manning

by Louis Bagger & Co.

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

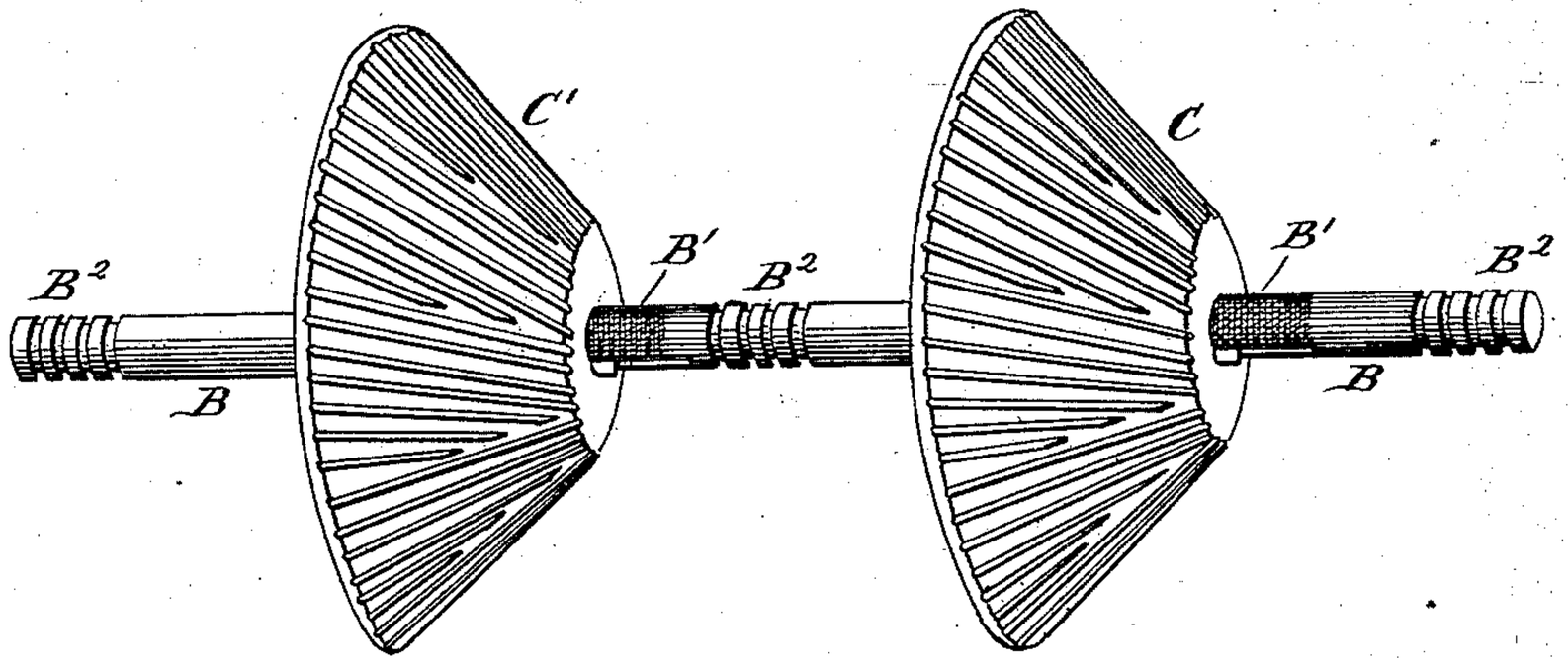


Fig. 3.

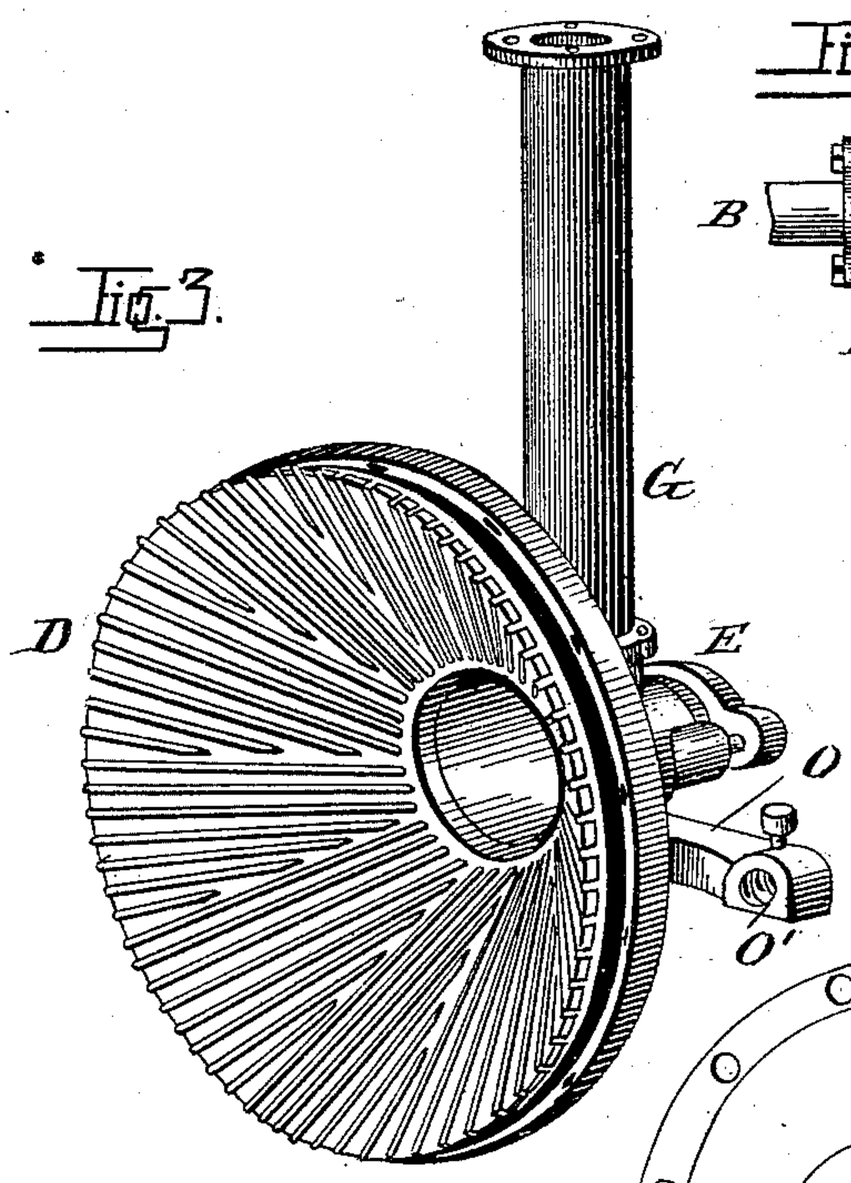


Fig. 4.

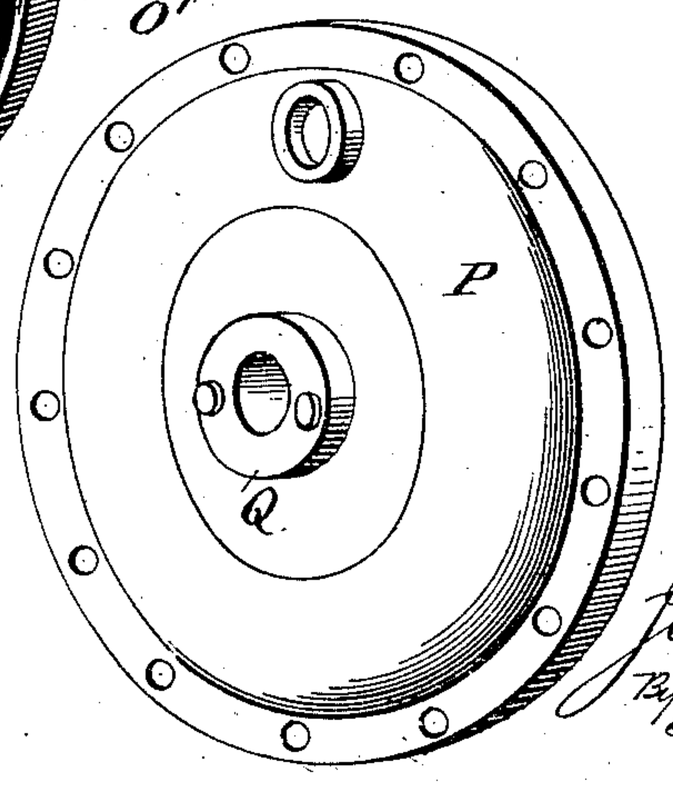


Fig. 5.

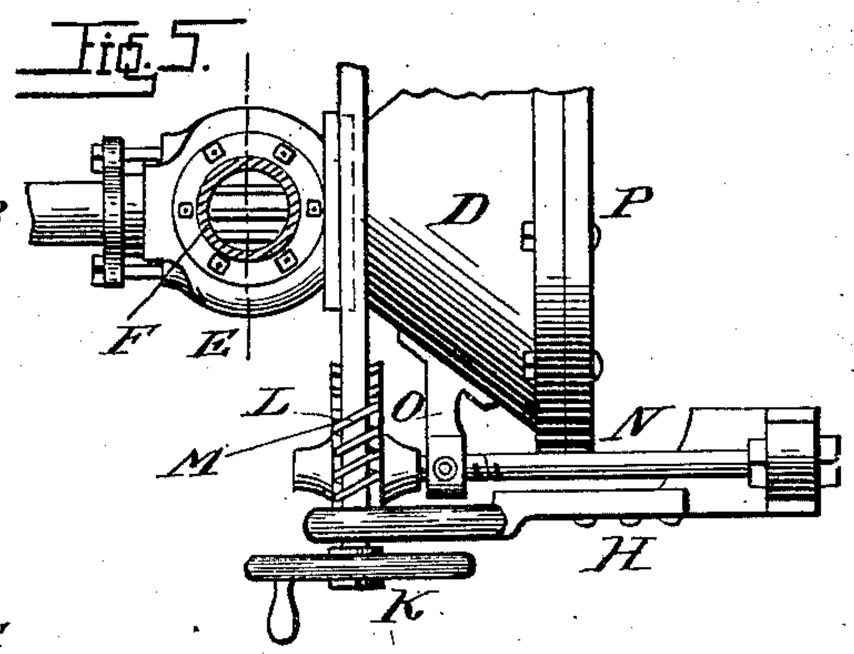
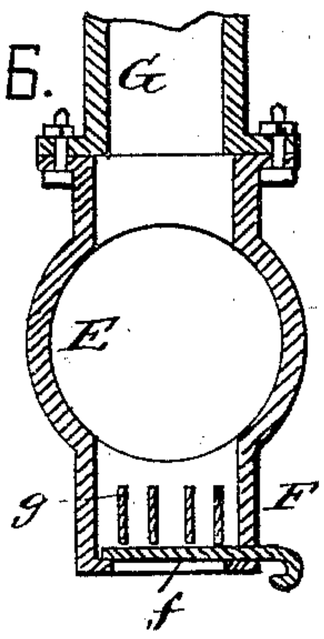


Fig. 6.



WITNESSES:

Fred. L. Dieterich

Arthur L. Morsell.

INVENTOR.

John J. Manning

By Louis Bagger & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN J. MANNING, OF GREAT BARRINGTON, MASSACHUSETTS.

BEATING AND REFINING ENGINE FOR PAPER-PULP.

SPECIFICATION forming part of Letters Patent No. 282,098, dated July 31, 1883.

Application filed June 20, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN J. MANNING, a citizen of the United States, and a resident of Great Barrington, in the county of Berkshire and State of Massachusetts, have invented certain new and useful Improvements in Beating and Refining Engines for Paper-Pulp; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a side elevation of my improved beating and refining engine. Fig. 2 is a perspective view of the shaft with its convex grinding-cores. Fig. 3 is a perspective inside view of one of the convex shells with its feed-pipe. Fig. 4 is a perspective detail view of one of the heads fitting upon and closing the concave shells. Fig. 5 is a detail view, showing the mechanism for adjusting the concave shells relative to the convex cores; and Fig. 6 is a sectional detail view of the receiving-chamber at the lower end of the feed-pipe with its pocket.

Similar letters of reference indicate corresponding parts in all the figures.

My invention has relation to so-called "beating" and "refining" engines used in the manufacture of paper for beating up and refining the pulpy fibers; and it consists in the improved construction and combination of parts of a machine of that class, as hereinafter more fully described and claimed, whereby I am enabled to accomplish better work with less power than is the case with any other machines of that class with which I am acquainted, my improved machine being adapted for use either as a beater and refiner or as a double refiner, according to the nature and condition of the stock used in the manufacture of the paper.

In the accompanying two sheets of drawings, A represents the bed of the machine, upon which are the standards I, forming bearings for the shaft B of the convex rotary cones C C'.

By reference to Fig. 2 of the drawings it will be seen that shaft B is provided with annular grooves or corrugations B^2 at the points or places where the shaft is boxed in the standards I, the boxes being provided with ribs or serrations, that fit into the annular corrugations B^2, so that while the shaft will rotate freely in its boxes or bearings it is prevented from moving in the direction of its length. I further provide shaft B with brass sleeves B' at the points where the shaft projects through the stuffing-boxes in the apex of the concave shells, and in the center of the plate covering the same, one of which plates is shown at P in Fig. 4, the letter Q indicating the stuffing-box. Shaft B is turned out or reduced in thickness at the points where said brass sleeves are shrunk upon it, so that the shaft will be of even dimensions throughout its length, except at the points where it is corrugated by the annular grooves B^2, for the purpose stated.

A rotary motion is imparted to shaft B and to the convex cores C C', which are keyed or otherwise fastened upon it by means of a drive-pulley, J, at one end of the shaft.

The stuff, of pulpy fibers, to be beaten and refined is fed into the beater-shell D from a receiver, L, and feed-pipe G, the lower end of which opens up into the receiving-chamber E, located at the apex of the concave shell, and provided with a stuffing-box, through which shaft B passes. This receiving-chamber E is provided with an enlargement or downward-projecting pocket, F, having an open bottom covered by a sliding plate, *f*. This pocket or receptacle is provided with a series of transverse plates, *g*, set on edge parallel to one another, and impinging with their lower edges upon the removable bottom plate, *f*, as will appear more clearly by reference to the detail view, Fig. 6, on Sheet 2 of the drawings. From the receiving-chamber E the stuff passes into the grinding-chamber inside of and formed by the concave beater-shell D, where the pulpy fibers are beaten and reduced by the knives or cutters on the rotary convex core C, operating in conjunction with the fixed knives or cutters on the inside of the concave shell D.

The knives or cutters on the cores as well as on the shells are made of steel, and arranged as shown in the drawings, with wood fillings between them to hold them firmly in place.

The concave beater-shell D, with its man-plate P, is adjustable upon shaft B, relative to the convex core which works inside, in such a

manner that by adjusting the position of the shell the distance between the knives on its inside and the knives upon the rotary core may be regulated so as to subject the pulpy fibers fed into it to action of the knives, so as to regulate their length. In other words, if the fibers are to be reduced into short lengths, the shell D and rotary core C are brought in close proximity with each other, whereas if it is desired to produce a pulp with long fibers (according to the class of paper to be made) the shell D is adjusted in the opposite direction, so as to increase the distance between it and the inside rotary core. This adjustment may be effected in various ways, and I prefer for this purpose to use the mechanism illustrated in Figs. 1 and 5 of the drawings. This consists in providing the adjustable shells D with laterally-projecting arms O, having screw-threaded boxes O′ at their outer ends, in which work screw-threaded shafts N, journaled in bearing-plates H, fixed upon the bed-plate A. At one end of each of the shafts N is fixed a gear wheel or pinion, M, which meshes with a worm, L, adapted to be turned by a hand-wheel, K. The shaft of this wheel K extends transversely across the machine, its other end being provided with a hand-wheel and worm adapted to engage a pinion and shaft located on the other side of the machine, so that the adjustment of the concave shell D may be effected with the utmost nicety and precision from either side of the machine, and in such a manner that the shell will work true or squarely forward and back, so that there is no danger of its binding upon the central shaft, B, or upon the threaded rods or shafts N, on which the shell works. I desire at this stage to say, however, that I do not limit myself to that precise mechanism for effecting the adjustment of the movable shells, as other means may be employed by which a like result may be effected.

The object of the brass sleeves B′, which work in the stuffing-boxes of the movable shell, is to prevent the packings from rusting and burning out, these sleeves being of such a length as to permit of the adjustment of the shell without the packings coming in contact with the shaft, except where this is provided with the brass sleeves B′.

As the stuff or pulpy fibers are fed into the beater-shell D, and there subjected to the first beating or grinding process, it is expelled by the centrifugal force through the discharge-pipe G′ into the receiving-tank L′ of the refiner, which consists of a concave shell, D′, covered at its large ends by a man-plate, P′, and operating in conjunction with the convex core C′, which is fixed upon and revolves with shaft B.

The refiner-shell D′ is made adjustable upon shaft B by a mechanism similar to that by which I effect the adjustment of the beater-shell D—viz., by the hand wheel or wheels K′ and their connecting-shaft, with its worms intermeshing with the pinions M′, one on each side of the machine. Thus it will be seen that the two concave shells D and D′ may be adjusted independent of each other, the receiving-tank L′ of shell D′ being open at the top, so that the discharge-pipe G′, which discharges from the beater-shell D into the receiving-tank L′, will have sufficient play in said tank to admit of the adjustment of the two shells D and D′. From tank L′ the stuff or pulpy fibers, as they come from the beater, are received through pipe G^2 in the receiving-chamber E′, after their condition has first undergone examination in the receiving-tank L′, for the purpose of determining the exact adjustment of the beater-shell and refiner-shell, whereby the best results may be obtained. From the refiner D′ the pulp is discharged through the outlet-pipe G^3.

In order to prevent foreign matter contained in the pulpy fibers from entering the beater-shell D, I provide the pocket F, the construction of which has been hereinbefore described, and the plates *g* of which will intercept foreign substances—such as buttons, stones, nails, and other hard substances which have become mixed with the fibers—and prevent them from entering the shell, where their presence would be apt to cause injury to the knives of the rotary cone, as well as of the shell. The receiving-chamber E′ of the refiner D′ is provided with a similarly-constructed pocket, F′, which will intercept any finer substances—such as sand or gravel—which have accidentally passed through with the long fibers from the beater. These impurities may readily be removed, whenever desired, by withdrawing the sliding bottoms *f* from their respective pockets F and F′, which may be done without stopping the machine or otherwise interfering with its operation.

If desired, the stuff may be fed from the receiving-chambers E and E′ into their respective shells by two pipes or inlets located on opposite sides of but in proximity to the apices of the shells, so that the stuff is fed into these not through the apex of the shell, but on opposite sides thereof, and on opposite side of the rotary shaft B, which passes through the apex of each of the shells and through the center of their respective receiving-chambers E and E′.

Having thus described my new invention, I claim and desire to secure by Letters Patent of the United States—

1. A beating and refining engine having two convex cores fixed upon a rotary shaft, said shaft being provided with means for preventing it from moving in its bearings in the direction of its length, and provided with a pair of adjustable concave shells adapted to be adjusted independent of each other in relation to their respective cores, substantially as and for the purpose shown and set forth.

2. A beating and refining engine having two convex cores fixed upon a rotary shaft, said shaft being provided with means for preventing

it from moving in its bearings in the direction of its length, in combination with a pair of adjustable shells, one for each of the cores, and means or mechanism for effecting the adjustment of said shells relative to their respective cores, independent of each other, substantially as and for the purpose shown and set forth.

3. In a beating and refining engine, the combination, with the concave beater and refiner shells and their feed-pipes, of a receiving-chamber located at the apex of and communicating with the shells, and provided with a downward extension or pocket adapted to collect any hard substances or impurities contained in the pulpy fiber before it is fed into the beating and refining shells, substantially as and for the purpose shown and set forth.

4. In a beating and refining engine, the pockets for intercepting foreign substances contained in the pulpy fiber on its passage to the grinder shells and cores, said pockets being constructed with a series of transverse plates set on edge parallel to one another, and provided with an open bottom having a sliding plate for opening and closing the pocket or receptacle, substantially as and for the purpose shown and set forth.

5. The combination, in a beating and refining engine, of the rotary shaft B, having the convex grinder-cores C and C′ fixed thereon, and provided with means for preventing it from moving in its bearings in the direction of its length, concave beater-shell D P, provided with means for effecting its adjustment upon shaft B relative to the inside core, receiving-tank L, feed-pipe G, receiving-chamber E, having the dirt-pocket F, discharge-pipe G′, projecting with its free end into the open tank or receiver L′, feed-pipe G^2, receiving-chamber E′, having the dirt-pocket F′, refiner-shell D′ P′, means or mechanism for effecting its adjustment upon shaft B relative to its inside core, and discharge-pipe G^3, the whole constructed and combined to operate substantially in the manner and for the purpose shown and set forth.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

JOHN JOSEPH MANNING.

Witnesses:
AUGUST PETERSON,
LOUIS BAGGER.