

(No Model.)

J. H. HORNE.
PAPER PULP REFINING ENGINE.

No. 428,913.

Patented May 27, 1890.

Fig. 1,

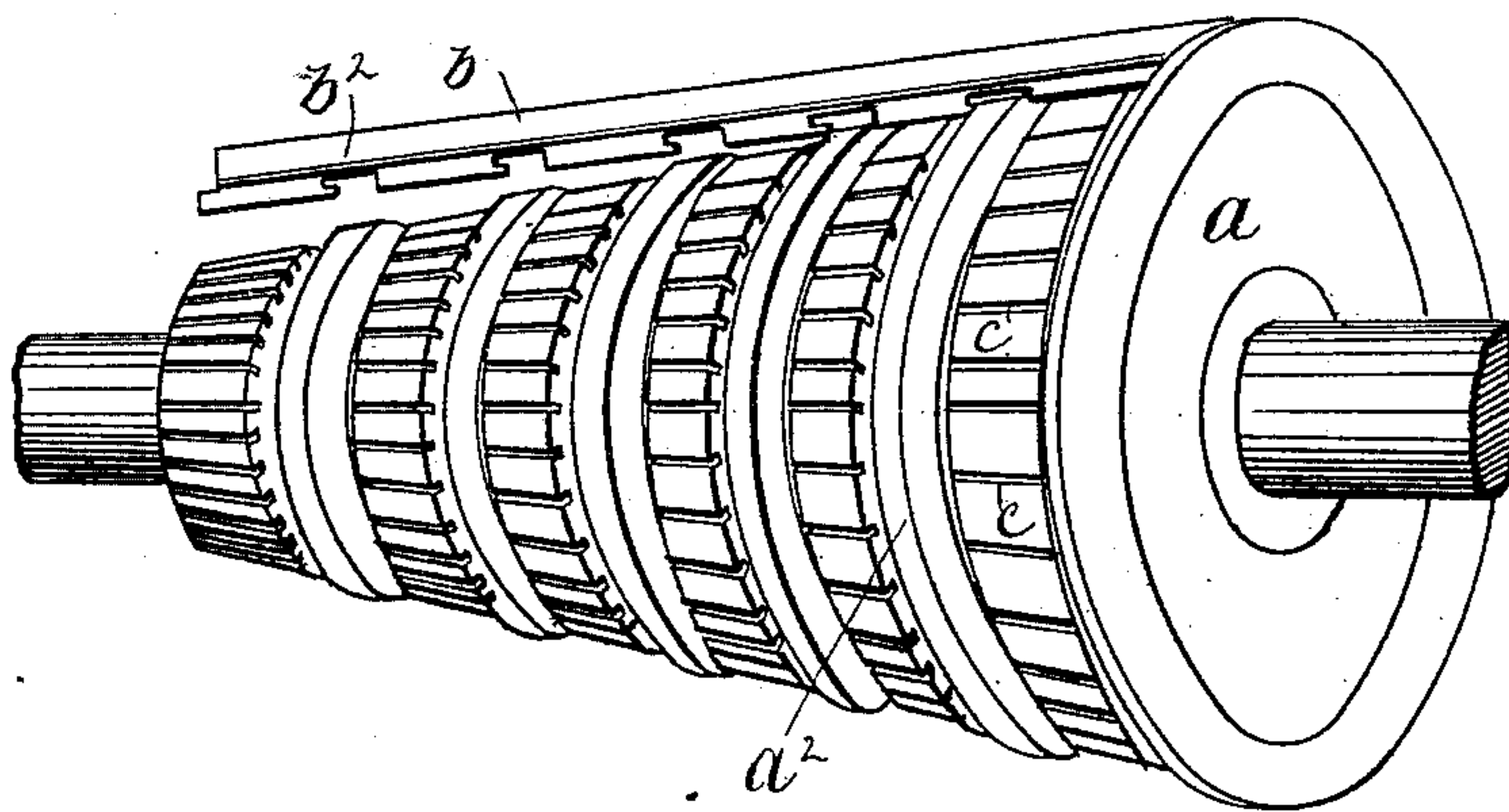


Fig. 2

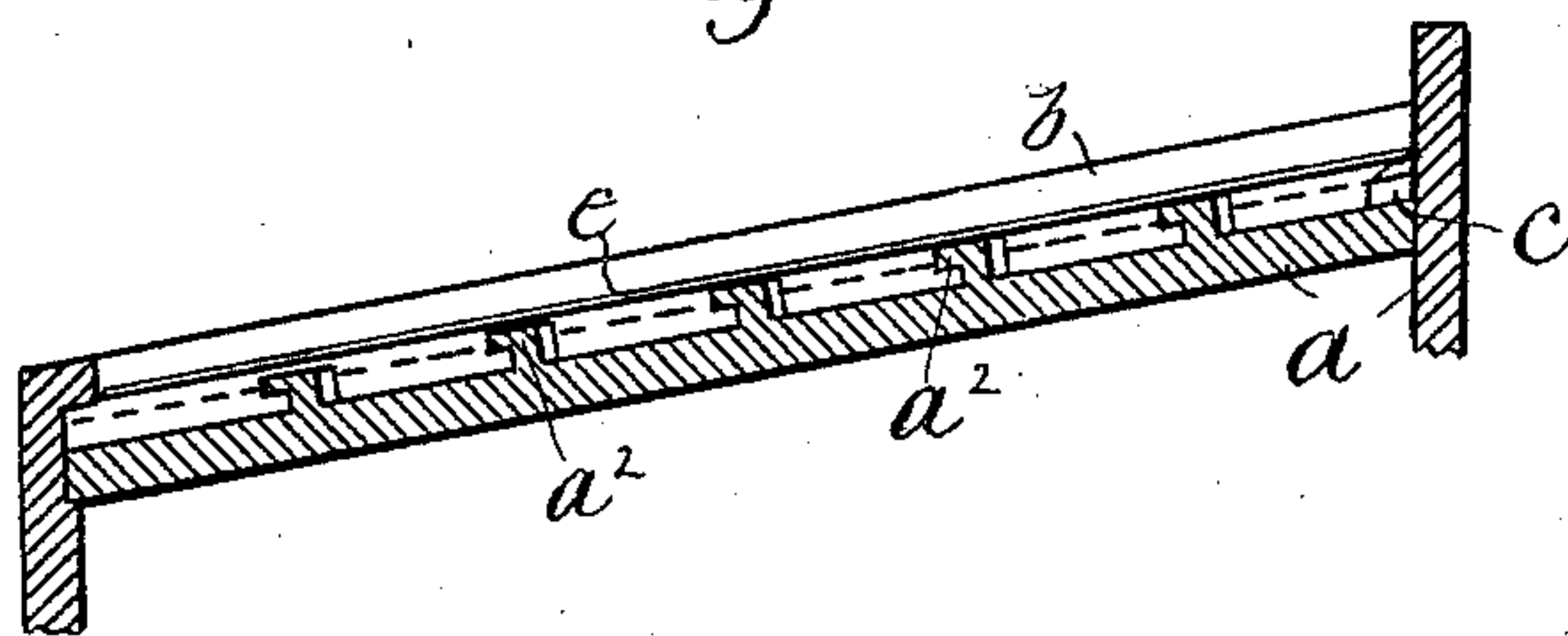
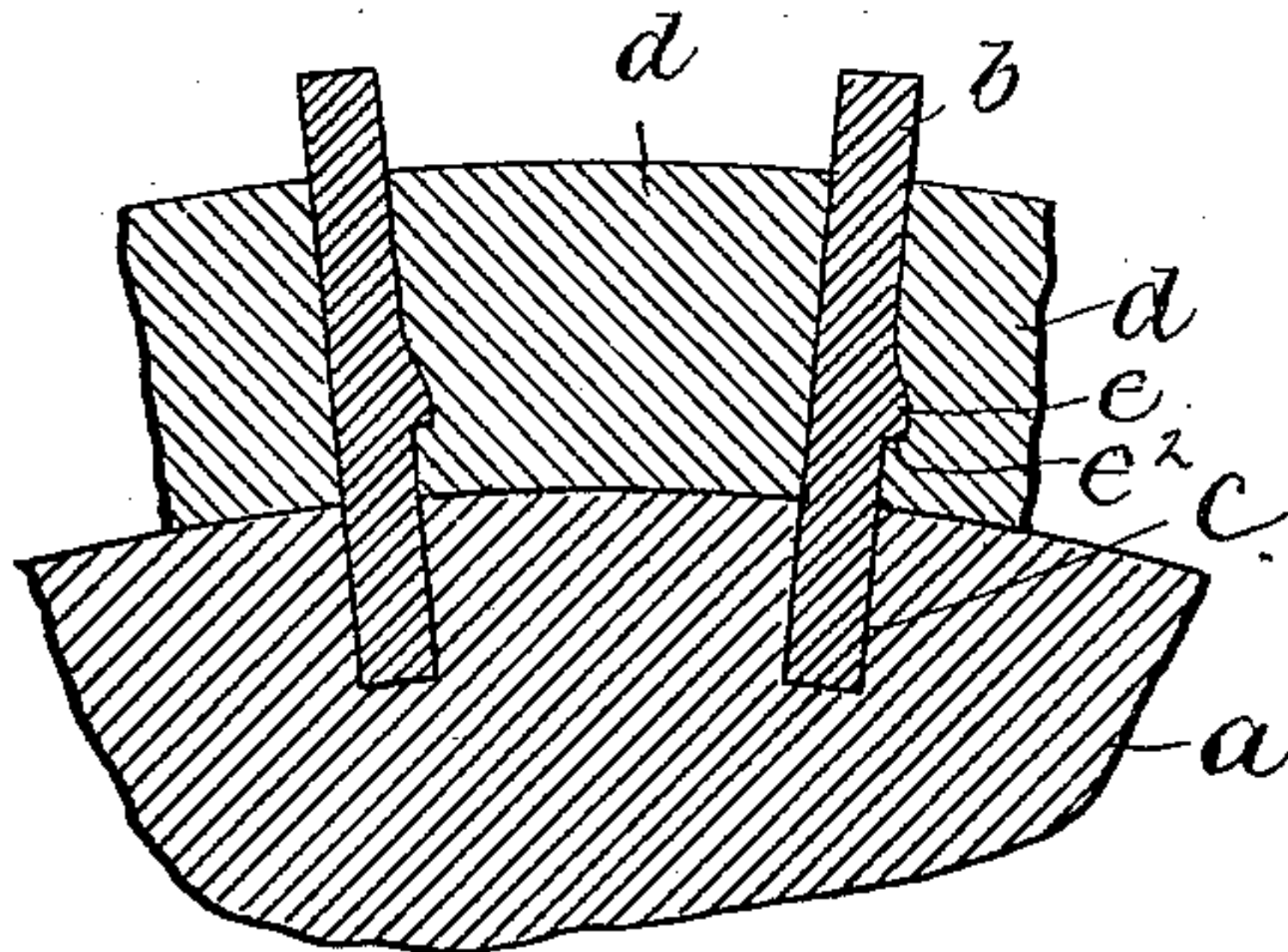


Fig. 3,



Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN H. HORNE, OF LAWRENCE, MASSACHUSETTS.

PAPER-PULP-REFINING ENGINE.

SPECIFICATION forming part of Letters Patent No. 428,913, dated May 27, 1890.

Application filed March 11, 1889. Serial No. 302,799. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. HORNE, of Lawrence, county of Essex, and State of Massachusetts, have invented an Improvement in Paper-Pulp-Refining Engines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention is shown embodied in a pulp-refining engine of the kind commonly known as the "Jordan" engine, and relates especially to the bars or blades which are used on the periphery of the rotating mandrel or plug to act upon and reduce the pulp. Engines of this class have a tapering mandrel commonly called the "plug," which is fastened to a shaft, by which it is rotated in the operation of the machine, and is provided on its outer surface with radially-projecting bars or blades, which act in conjunction with stationary bars on the case that incloses the plug to cut or grind the pulp to the required degree of fineness. These knife bars or blades are commonly made of steel, and are originally about two inches in width and a quarter of an inch in thickness, and are embedded to a certain depth in longitudinal grooves formed in the surface of the plug, so that they project out radially from the surface, and usually the new bars, before they have been worn by the operation of the machine, project a distance of about an inch and a half from the periphery of the plug. Such amount of projection is too great for the required cutting action, and consequently the space between the adjacent pairs of bars is filled in by strips of wood to within a distance of about half an inch from their outer edges. These filling pieces or woods are driven tightly into place; but considerable difficulty is experienced in the operation of the engine by the wood strips becoming loose and being thrown out from between the bars.

The object of the present invention is to insure a secure fastening of the filling-woods between the knives, so that they cannot become loose or be thrown out at any time in the operation of the engine, and to accomplish this result the knives are, in accordance with this invention, provided with lateral projections in the portion that is outside of the

grooves of the plug, which projections terminate in a shoulder on the side toward the plug. The said projections are slight in amount (a sixteenth of an inch is sufficient) and the wood will yield in passing said projections in being driven into place between the blades, after which the natural expansion of the wood, which is increased by its swelling when exposed to the moisture of the pulp in the engine, causes the wood to be firmly interlocked with the projection on the blade, so that it cannot work loose or be thrown out from the plug.

Figure 1 is a perspective view of the plug of a refining-engine, illustrating the manner of attaching the blades thereto, and showing some of the blades in position before the filling-strips have been inserted; Fig. 2, a detail showing a portion of the plug in longitudinal section and one of the blades in side elevation; and Fig. 3, a sectional detail showing a portion of the plug and the bars or knives in position, with one of the woods or filling-pieces inserted and secured between the knives in accordance with this invention.

The plug *a*, Fig. 1, may be of usual construction and provided with any of the usual appliances for securing the bars or cutters *b* therein, the said bars being shown in this instance as adapted to be attached to the plug by means of undercut notches *b*², engaging with correspondingly-shaped rings *a*² on the plug, such means for fastening the knives being now in use and forming no part of this invention.

A portion of the blade is embedded in a groove *c* in the plug, as best shown in Fig. 3, leaving, however, the greater part of the width of the blade projecting out beyond the periphery of the plug, as there shown. The space between the said blades is then filled to within a short distance from the outer edges of said blades by longitudinal strips *d*, of wood, which strips or woods have heretofore been merely carefully fitted between the blades, and in the construction most generally used have been retained in their position only by their tight fit in the space between the blades, the sides of which projecting from the plug have been entirely smooth, although in some cases means have been provided for retaining the wood in blades. The spaces be-

tween the blades, however, diverge outwardly from the plug, owing to the radial arrangement of the blades, so that, except when the fastenings are provided, if the woods begin
5 to work loose, they easily drop out, and having once dropped out of position it is almost impossible to make them remain in place again, and such loosening of the woods is a cause of much trouble and delay in the operation of engines of this kind. In order to obviate this difficulty and to securely fasten the woods in place, the blades are, in accordance with this invention, provided with projections *e* on the sides of the portion outside the
15 grooves in the plug, said projections extending the entire length of the blades, and preferably rising gradually from the face of the blade toward the plug, and terminating in a sharp or, if desired, undercut shoulder at *e*²
20 on the side toward the periphery of the plug, and thus being somewhat in the form of a ratchet-tooth, as shown in Fig. 3. The said projections constitute a continuous rib along one or both sides of the blade, which may be
25 made in the process of rolling the bars from which the blades are made, and, if desired, more than one such projection may be used, and they may be on one or both sides of the bar. It is generally sufficient, however, to
30 have a single projection along one side of each bar, as shown in Fig. 3. The projections are very slight in amount, and the woods may be made the same as if intended to fit knives not having such projections, and when driven
35 into place yield sufficiently to pass the projections without injuring the wood, which expands beneath the shoulders *e*², and thus interlocks the filling-pieces with the blades, so as to hold them securely in position between

the said blades, the swelling of the wood, 40 which takes place when it is exposed to the moisture of the pulp, increasing such holding-power. Besides thus locking the woods in position, the said projecting ribs also serve to stiffen the blades, and to thereby diminish 45 the chattering or vibration of the said blades when in use, which, apart from the positive locking of the woods by the projections, also diminish the tendency to jar or throw the woods out from between the blades. 50

The invention is not limited to any specific construction of the mandrel and means for fastening the blades thereto, and is applicable to blades of this kind when fastened to the mandrel, plug, or roll in any manner—as, 55 for example, when they are wholly outside the periphery of the main body of the plug, instead of embedded in grooves therein.

I claim—

The combination, with the plug or mandrel, 60 of blades fastened thereto and projecting radially therefrom, and having ribs extending the entire length of such blades and projecting from the face of the blades gradually and each terminating in a shoulder, and filling- 65 pieces or woods forced in between the blades and over the ribs and engaged by the shoulders of the ribs to prevent escape of the woods, the ribs also serving to strengthen the blades, substantially as shown and described. 70

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN H. HORNE.

Witnesses:

JOS. P. LIVERMORE,
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