June 19, 1928. 1,674,231

L. A. THOMAS

PULP REFINING MACHINE

Filed Oct. 26, 1927 5 Sheets-Sheet 1

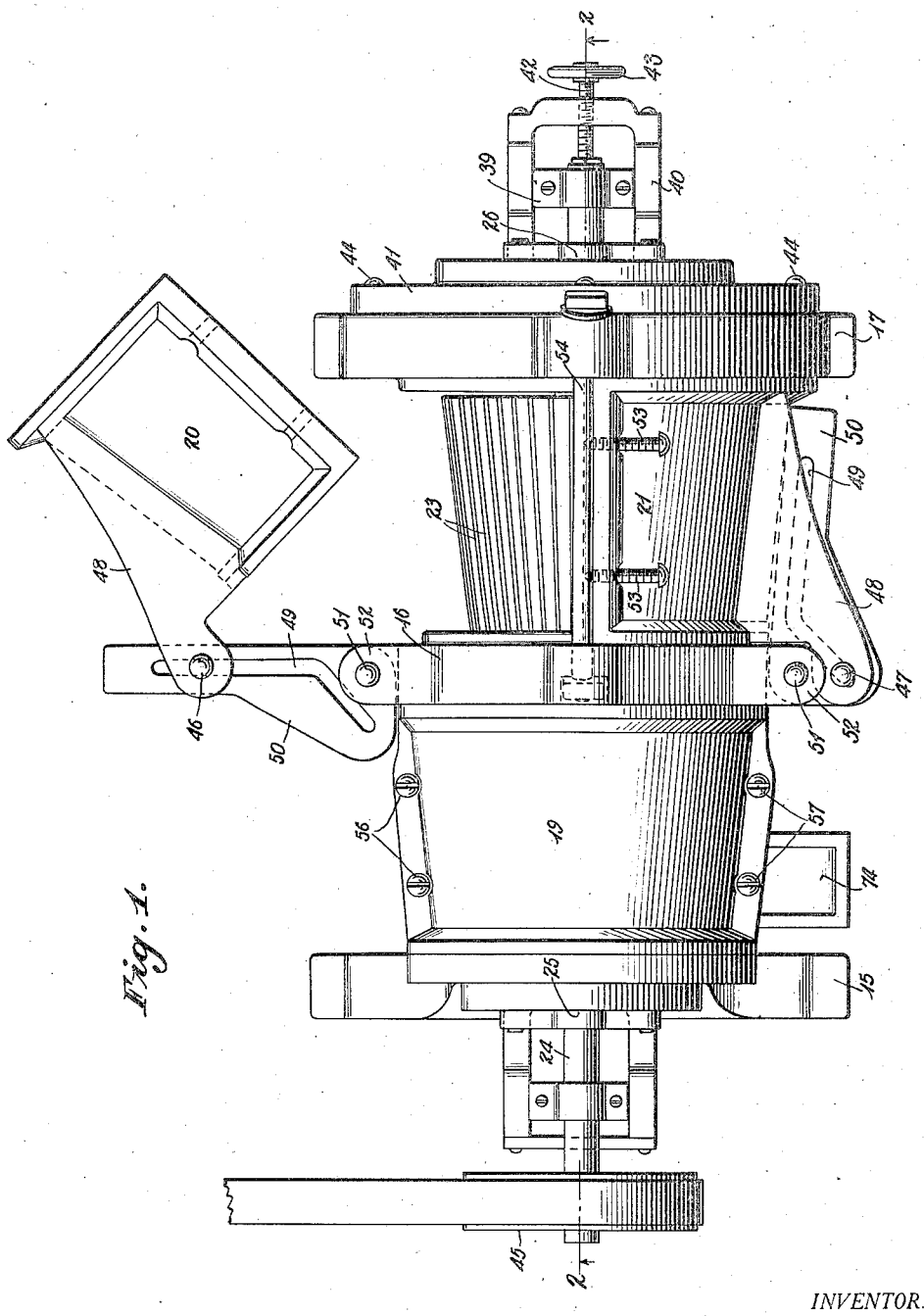


Fig. 1.

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June 19, 1928. 1,674,231

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Filed Oct. 26, 1927 5 Sheets-Sheet 2

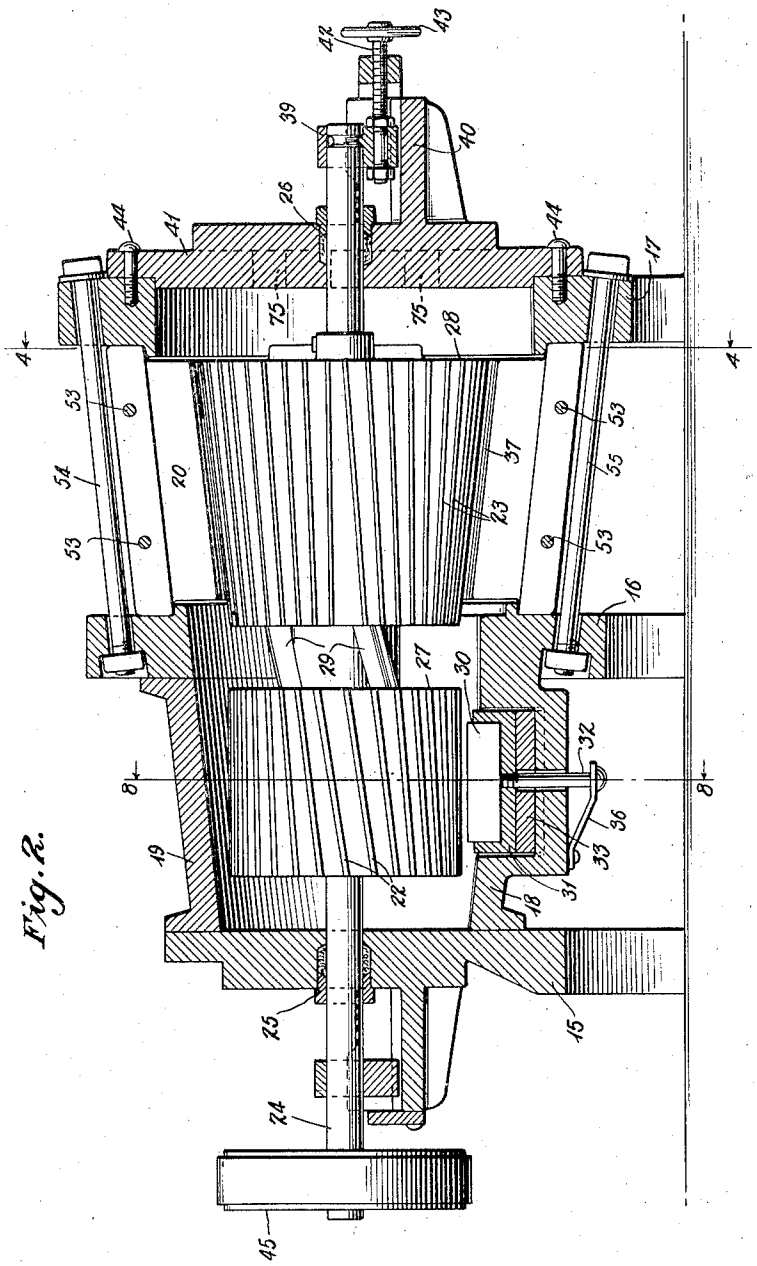


Fig. 2.

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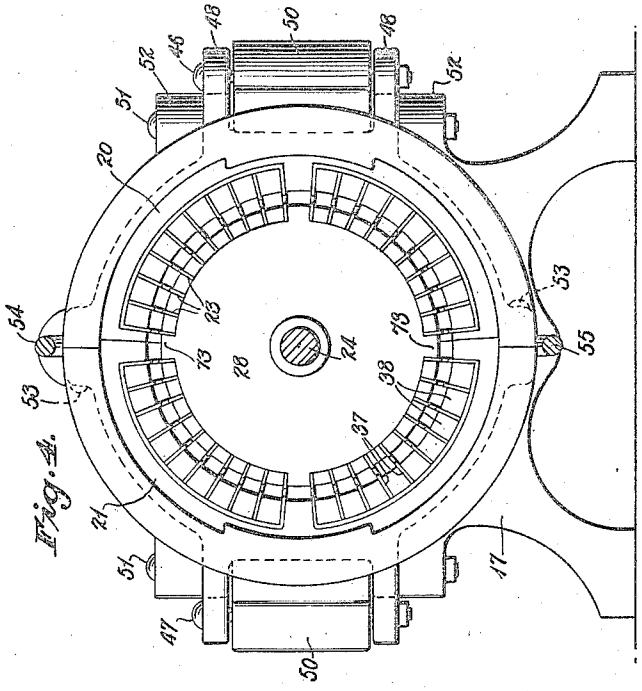
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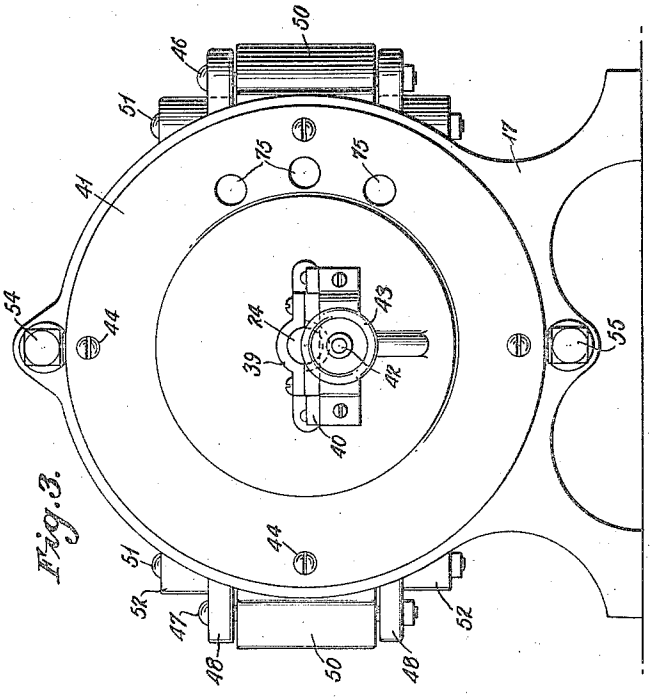
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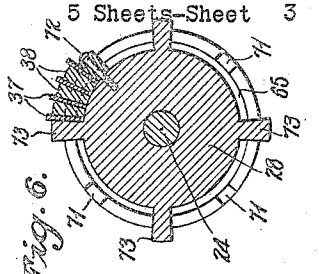
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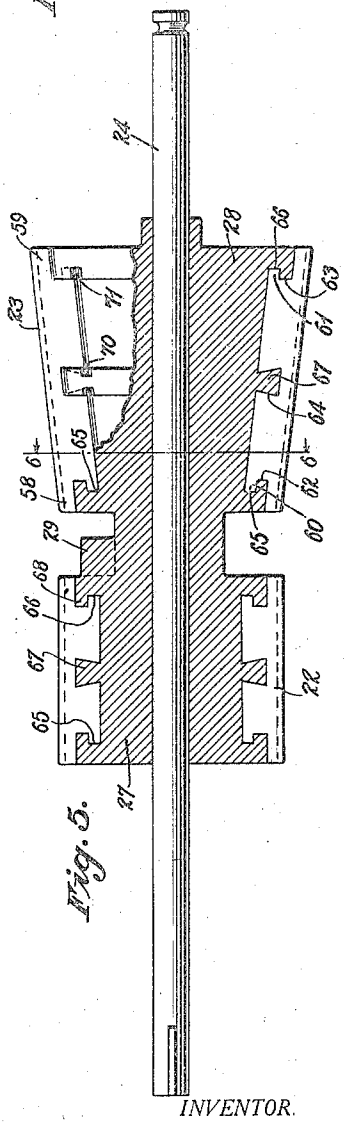
PULP REFINING MACHINE

Filed Oct. 26, 1927 5 Sheets-Sheet 3









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PULP REFINING MACHINE

Filed Oct. 26, 1927 5 Sheets-Sheet 4

Fig. 8.

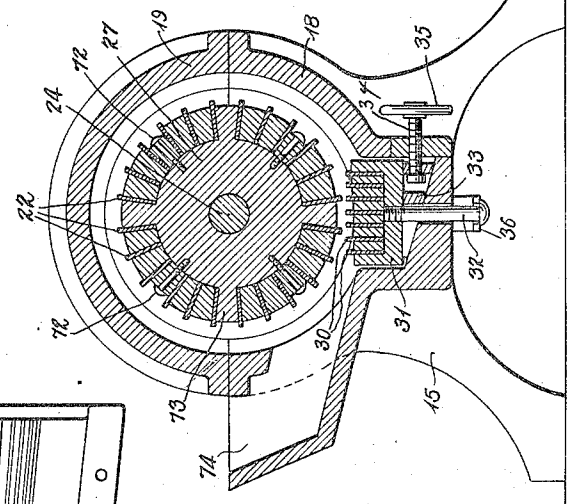


Fig. 7.

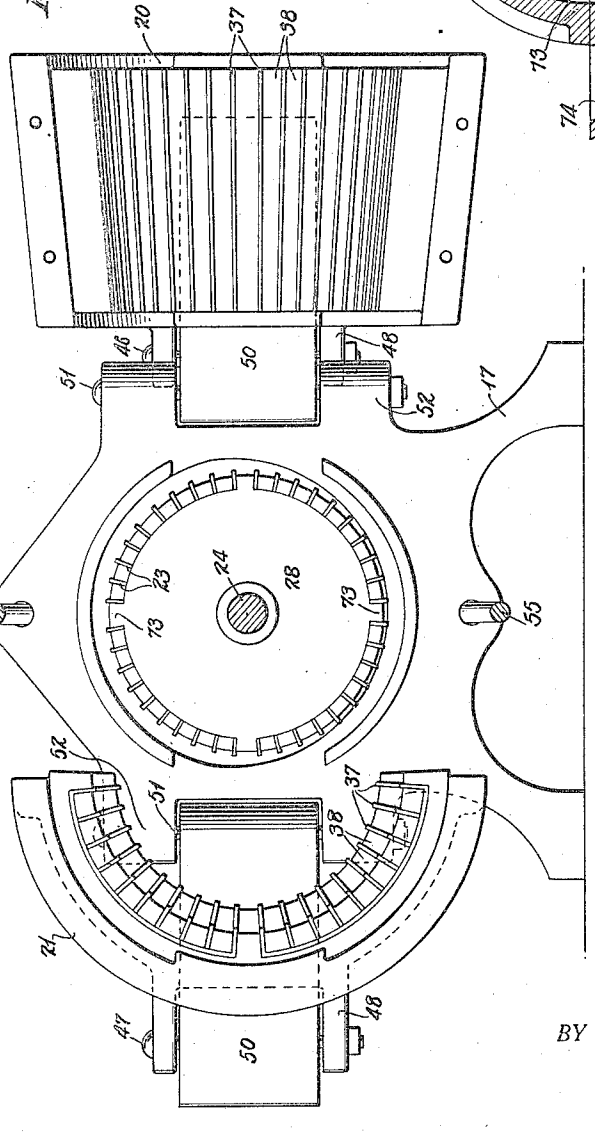


Fig. 10.

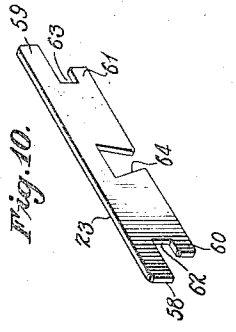
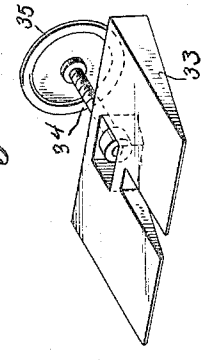


Fig. 9.



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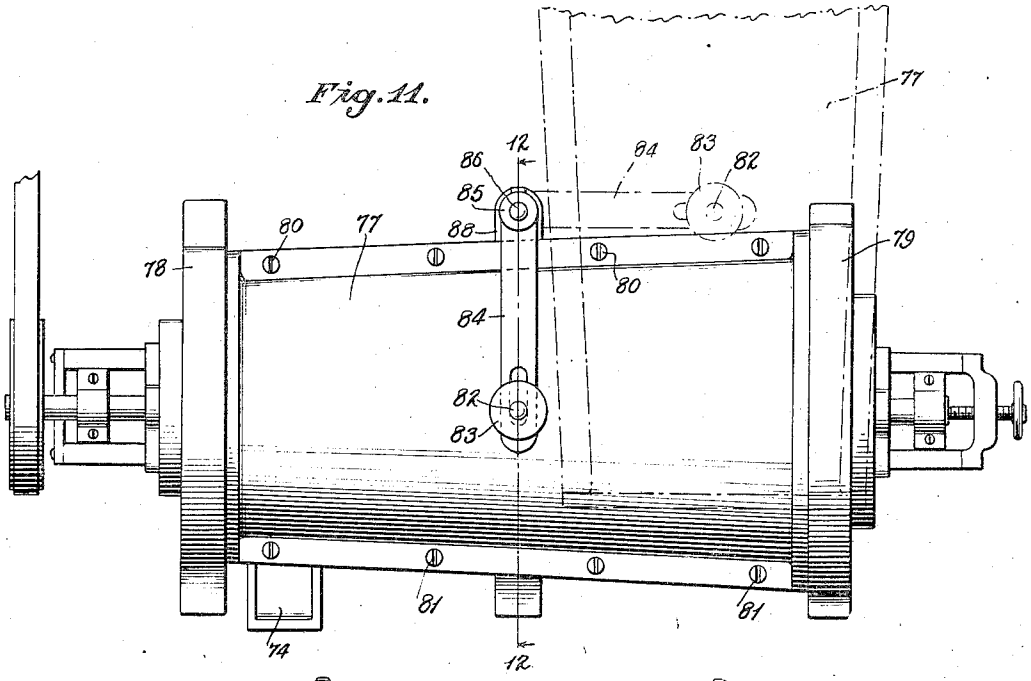
June 19, 1928. 1,674,231

L. A. THOMAS

PULP REFINING MACHINE

Filed Oct. 26, 1927 5 Sheets-Sheet 5

Fig. 11.



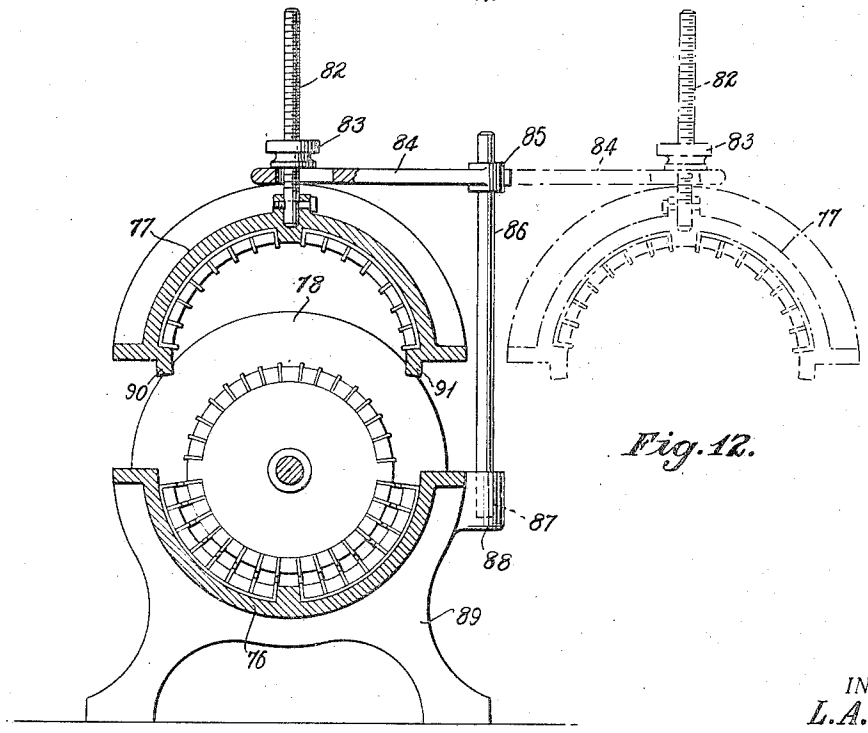


Fig. 12.

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Patented June 19, 1928. 1,674,231

UNITED STATES PATENT OFFICE.

LARKIN A. THOMAS, OF ATLANTA, GEORGIA.

PULP-REFINING MACHINE.

Application filed October 26, 1927. Serial No. 228,802.

The invention relates to pulp refining machines of the Jordan type and has as an object the provision of a machine of this character having pulp refining means of more than one character.

It is a further object of the invention to provide a machine for refining pulp which will greatly shorten the length of time necessary for the process.

It is a further object of the invention to provide a machine which will produce a pulp of superior character in less time than machines heretofore in use have produced.

It is a further object of the invention to provide a machine for refining pulp the parts of which machine are readily accessible for repair or replacement.

Further objects of the invention will appear from the following description when read in connection with the accompanying drawings showing an illustrative embodiment of the invention and wherein:—

Fig. 1 is a plan view with one portion of the casing swung open for access to the interior;

Fig. 2 is a vertical section on line 2—2 of Fig. 1;

Fig. 3 is an end view of the discharge end of the machine;

Fig. 4 is a vertical section on line 4—4 of Fig. 2;

Fig. 5 is a central vertical section of the revolving element of the machine partly broken away;

Fig. 6 is a vertical section on line 6—6 of Fig. 5;

Fig. 7 is a section on line 4—4 of Fig. 2 with the parts of the casing in open or partly open position;

Fig. 8 is a transverse section on line 8—8 of Fig. 2;

Fig. 9 is a perspective view of the knife adjusting means;

Fig. 10 is a perspective view of one of the breaker bars;

Fig. 11 is a plan view of a modified form of the invention; and

Fig. 12 is a transverse section on line 12—12 of Fig. 11 showing in dotted lines the top of the casing swung clear of the machine.

As shown in Figures 1 to 8 inclusive, the device comprises spaced frame members 15, 16, 17, and a casing formed in sections, one section 18 supported between the frame members 15, 16, comprising the lower half of the casing of this portion of the machine and a second section 19 forming the upper half of the casing of this portion of the machine. In this form of the invention also the casing is made up of sections 20, 21 supported between the frame members 16, 17.

To carry breaker bars 22, 23, there is shown a revolving member rigidly mounted upon a shaft 24 journaled at 25 in the frame member 15 and at 26 in the frame member 17. The bars 22 are shown as mounted upon a cylindrical block 27 and placed at an angle to the axis of the block, as clearly indicated in Figure 2, while the bars 23 are placed upon a frusto-conical block 28 and are placed thereon over one half of its surface in planes passing through the axis of the block, and over the remaining half at angles similar to the bars 22 on block 27.

To feed material from the portion of the casing which is made up of sections 18, 19, where it is acted upon by the bars 22 to the portion of the casing made up of sections 20, 21 where the material is acted upon by the bars 23, there are shown ribs 29 mounted upon a cylindrical block of less diameter than block 27, said ribs being angularly disposed upon said portion so as to force material in the machine toward the block 28.

To coact with the bars 22, there are shown a plurality of blades 30 in Figure 8 mounted in a block 31, which block is adjustably mounted upon a screw 32 to hold the block down to its adjusted position and which block 31 may have its height adjusted by means of wedge member 33, illustrated in detail in Figure 9, the position of which wedge member may be adjusted by means of screw 32, by means of screw 34 and hand wheel 35, which adjustment is retained by the action of spring 36, Fig. 2, pulling downwardly upon the screw 32.

To coact with the bars 23 upon block 28, the sections of the casing 20, 21 are shown as fitted interiorly with a plurality of knives or bars 37 mounted between spacers 38. To adjust the space between the bars 23 and the knives 37, the shaft 24 upon which the blocks 27, 28 are mounted may be adjusted longitudinally by means of the sliding block 39 slidably carried in the way 40 mounted upon a cover plate 41 secured to the frame member 17, which block may be longitudinally adjusted by means of screw 42 by means of hand wheel 43.

The shaft and block assembly may be re-

moved from the device by removing the screws 44 securing the plate 41 to the frame and by removing the guide pulley 45, after which the shaft 24 may be pulled out through the journal 25.

The knife 37 and spacer 38 assembly is preferably made up in sections comprising one-quarter each of the casing. For ready access to these sections and for repair or removal, the casing sections 20, 21 are shown as carrying pintles 46, 47 mounted in projecting portions 48 and the pintles 46 engage slots 49 in swinging blocks 50 pivotally mounted upon pintles 51 rigidly carried by lugs 52 formed upon the frame member 16. In a closed position the sections 20, 21 are secured together as by means of screw 53. If the screws 53 be removed the sections 20, 21 may be moved laterally until free of frame members 16, 17 and may then be swung into open position shown at the top of Fig. 1, in which position the quarter sections made up of knives 37 and spaces 38 may be readily replaced or repaired.

When the sections 20, 21 are closed, the frame members 16, 17 are pulled into tight engagement with the edges thereof by means of bolts 54, 55 passing through lugs of the frame.

The upper portion 19 of the casing is shown as secured to the lower portion 18 thereof by means of screws 56, 57. When these screws are removed the section 19 of the casing may be freely lifted away from the machine whereby to secure access to the interior thereof at this portion.

To secure the bars 22, 23 in the blocks 27, 28, the blocks are given the formation shown in Figure 5.

As shown in Figure 10, the bars are formed with overhanging portions 58, 59 and overlying portions 60, 61 defining recesses 62, 63 therebetween. There is also shown a dovetailed recess 64 in the center of the bar. The blocks 27, 28 are formed with recesses 65, 66 adapted to receive the portions 60, 61 of the bars and also a dovetailed rib 67 adapted to be received by recess 64. At one portion upon the block there is a notch 70 in the rib 67 and also a notch 71 in the overhanging lip 68 defining the recess 66 so that the bars may be placed and slipped around upon the block into assembly with spacers shaped in conformity with the bars but of less width, alternating therewith to make up the assembly after which the notch 70 in the rib 67 and the notch 71 in the portion 68 may be closed by a final spacer of proper form secured in place as by a screw 72.

Preferably the described assembly is made in quarters having spacers 73 separating the quarters and formed integral with the blocks, there being four of the notches 70, 71 in each of the blocks 27, 28.

The bars 22 and a portion of the bars 23 are placed at an angle to the axis of shaft 24 so as to provide a sliding cutting action upon the fibres of the pulp whereby the fibres are not broken into as short lengths as would be the case by the breaking action of knives arranged axially of the shaft, and the pulp introduced into the machine through the opening 74 to the portion of the casing occupied by the block 27 is first acted upon by the angle bars 22 to produce relatively long fibres not finely comminuted.

The pulp is discharged from the machine through openings 75 in cover plate 41 and the speed with which it is allowed to be discharged will determine the length of time to which the pulp is submitted to the action of the machine and also the speed of feeding of the pulp by means of bars 29 from the field of action of angle bars 22 to the field of action of bars 23.

In the modification of the invention shown in Figures 11 and 12, the casing is made up of a lower section 76 and an upper section 77 mounted between the frame members 78, 79 and secured together as by screws 80, 81. By removal of the screws 80, 81, the upper section 77 of the casing may be freely lifted away. To assist in such action there is shown a screw 82 bearing a nut 83 abutting against an arm 84 pivotally mounted at 85 upon a vertical shaft 86 seating in socket 87 in a lug 88 carried by a central portion 89 carried by the frame. The lower portion 76 of the casing is preferably cast integral with the central portion 89 of the frame and with the end members 78, 79 thereof.

The portion 77 of the casing may be lifted by screwing down upon nut 83 until clear of the frame of the device when it may be swung to the position shown in dotted lines whereupon the quarter sections bearing the knives 37 may be replaced or repaired, the lower knives upon the section 76 being retained in position, when the casing is closed, by ribs, 90, 91 carried by the upper portion 77 of the casing.

Strictly speaking the action of both the angle bars and the axial bars might be referred to as a shearing action but for purposes of differentiation it is perferred herein and in the claims to refer to the action of the former as shearing and of the latter as a breaking action. If all of the bars were placed on an angle the output would be of stringy character and if all were axial the output would consist of much shorter fibres than results from the combination illustrated.

In former practice it has been necessary to treat material in a preparatory machine or breaker for from two to four hours. By the use of the present invention it is only necessary to retain the material in the breaker for from thirty minutes to one hour

and the time in the refining machine or beater is reduced in equal proportion resulting in a saving of time of substantially fifty per cent while securing a much improved result.

Minor changes may be made in the physical embodiment of the invention within the scope of the appended claims without departing from the spirit thereof.

I claim:

1. A pulp refining machine comprising, in combination, a casing having inlet and outlet openings, a plurality of fibre separating means of differing characteristics housed in said casing, and means in said casing for feeding material from one of said fibre separating means to another thereof.

2. A pulp refining machine comprising, in combination, a casing having inlet and outlet openings, fibre separating means in said casing adjacent the inlet opening having a certain character, fibre separating means in the casing adjacent the outlet opening, a portion of said last named means being of the same character as said first named means and the remaining portion differing therefrom.

3. A pulp refining machine comprising, in combination, a casing having inlet and outlet openings, a plurality of series of knives upon its interior, a shaft journalled in the casing, a plurality of blocks fixed upon said shaft, said blocks bearing bars adapted to cooperate with said knives for the separation of fibres, bars upon the block adjacent said inlet opening being arranged at an angle to the axis of the shaft and bars upon the block adjacent the outlet opening arranged in planes passing through the axis of the shaft.

4. A pulp refining machine comprising, in combination, a casing having inlet and outlet openings, a plurality of series of knives upon its interior, a shaft journalled in the casing, a plurality of blocks fixed upon said shaft, said blocks bearing bars adapted to cooperate with said knives for the separation of fibres, bars upon the block adjacent said inlet opening being arranged at an angle to the axis of the shaft and bars upon the block adjacent the outlet opening arranged in planes passing through the axis of the shaft and other bars upon the last named block arranged at an angle to the axis of the shaft.

5. A pulp refining machine comprising, in combination, a casing having inlet and outlet openings, a plurality of sets of knives upon the inner surface of the casing, a plurality of blocks rigidly fixed on said shaft bearing projecting bars adapted to revolve closely adjacent the edges of said knives for the separation of fibres and means to adjust the separation between said bars and knives.

6. A pulp refining machine comprising, in combination, a casing having inlet and outlet openings and having a plurality of knives upon its inner surface, a shaft journalled in said casing, a plurality of blocks rigidly secured to said shaft bearing bars rotating with said shaft closely adjacent the edges of said knives and means whereby portions of said casing may be readily swung to an open position for access to said knives.

7. A pulp refining machine comprising in combination, a casing having inlet and outlet openings, said casing bearing a plurality of knives upon its inner surface, a pair of blocks rigidly secured to said shaft, one block adjacent the inlet opening and the other adjacent the outlet opening, a plurality of bars carried by said blocks adapted to rotate with said block closely adjacent the edges of the said knives, the bars upon the block adjacent the inlet opening being arranged at angles to the axis of the shaft, certain of the bars upon the remaining block arranged in planes passing through the axis of the shaft and means to feed material in the casing from the portion about the first named block to the portion about the second named block.

8. A pulp refining machine comprising, in combination, a casing having inlet and outlet openings and a plurality of sets of knives upon its inner surface, a shaft journalled in the casing, a cylindrical block fixed upon said shaft adjacent the inlet opening, bars projecting from the surface of said block and angularly arranged with respect to the axis of the shaft, a frustro-conical block fixed to said shaft adjacent the outlet opening and bearing a series of bars arranged in planes passing through the axis of the shaft and a second series of bars upon the last named block angularly arranged with respect to the axis of the shaft, the interior of the casing being concentric with each of said blocks and means to adjust the separation between said bars and knives.

9. A pulp refining machine comprising, in combination, a casing having inlet and outlet openings, a plurality of sets of knives carried by the interior of the casing, a shaft journalled in the casing, a plurality of blocks fixed upon said shaft and bearing bars adapted to coact with each of said sets of knives, the upper portion of said casing being removable, means mounted upon the device to raise said removable portion of the casing and to swing the same clear of the lower portion thereof.

10. A pulp refining machine comprising, in combination, a casing, a revoluble member journaled in said casing comprising a cylindrical block and a frusto conical block coaxial therewith, bars projecting from said blocks, a knife carrying block carried by said casing radially of said cylindrical block, means for adjusting the spacing of said

knife block from said cylindrical block, knives carried by the interior of the casing coacting with the bars on said frusto conical block and means for adjusting said member axially of the casing to change the spacing between said last named knives and bars.

11. A pulp refining machine comprising, in combination, a casing having inlet and outlet openings, a series of knives carried by the interior of the casing, a block journaled in the casing comprising a circumferentially recessed central portion, an annular flange at each end of the block overhanging said recess, a plurality of bars each having a body lying in said recess and a shoulder underlying each flange, filler blocks also lying in said recess spacing said bars apart and retained by shoulders underlying said flanges, said bars revolving with said block in close proximity to said knives.

12. A block for pulp refining machines comprising, in combination, a member of circular cross section, oppositely directed, overhanging annular flanges one adjacent each end of said members, a series of bars mounted on edge on said member, and projecting radially thereof, each bar carrying oppositely directed shoulders extending axially of the member and underlying said flanges, spacing blocks separating said bars and of less width radially of the member than said bars, said spacing blocks having oppositely extending shoulders also underlying said flanges.

13. A block for pulp refining machines comprising, a member circular in cross section and having a circumferential recess and annular flanges overhanging said recess, a plurality of bars having their ends overlying said flanges and their bodies entering said recess, said bodies carrying shoulders underlying said flanges, and spacing filler blocks of less width radially of the member than said bars, said filler blocks retained in said recess by shoulders underlying said flanges.

14. A block for pulp refining machines comprising, in combination, a body having a circumferential recess and an inwardly facing annular flange at each end of the recess, bars and spacing blocks of less width than the bars, said bars and blocks having portions lying in said recess and shoulders underlying said flanges, one of said flanges notched to permit entry of a shoulder of each bar and block to be subsequently moved circumferentially to position, and a spacing block filling said notch to retain the assembly.

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