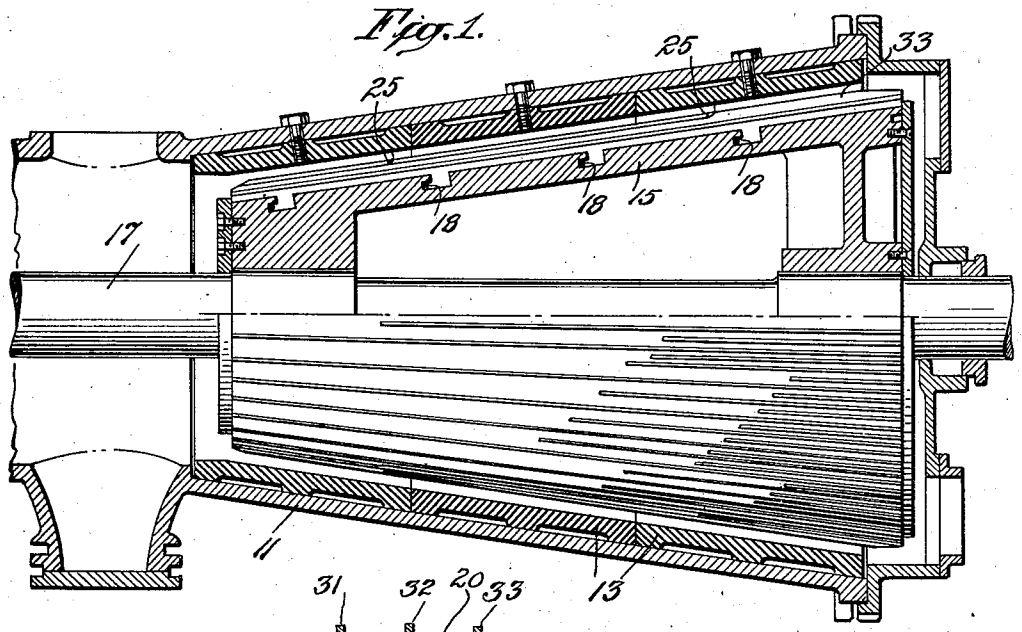
April 16, 1940. H. M. KEATING 2,197,182

JORDAN FILLING

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Fig. 1.



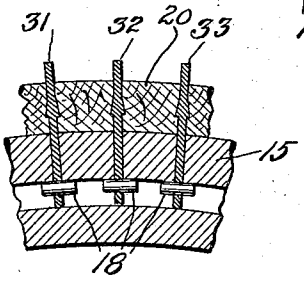


Fig. 2.

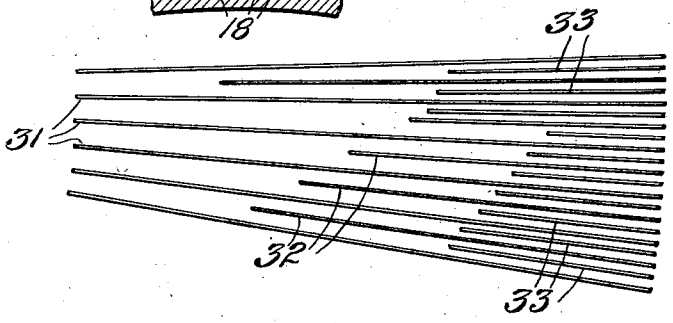


Fig. 3.

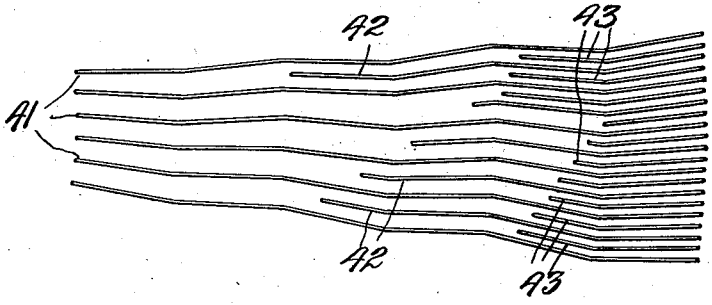


Fig. 4.

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Fig. 5.

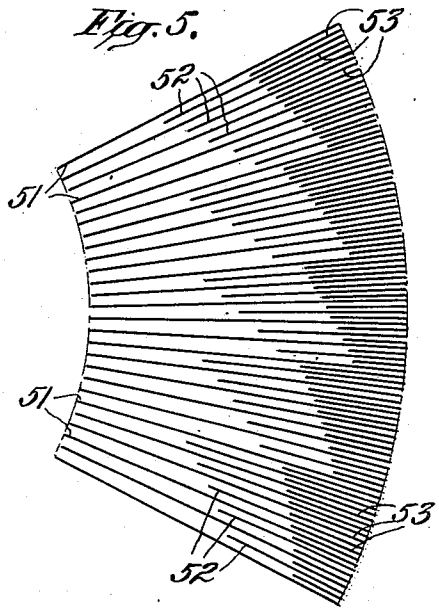
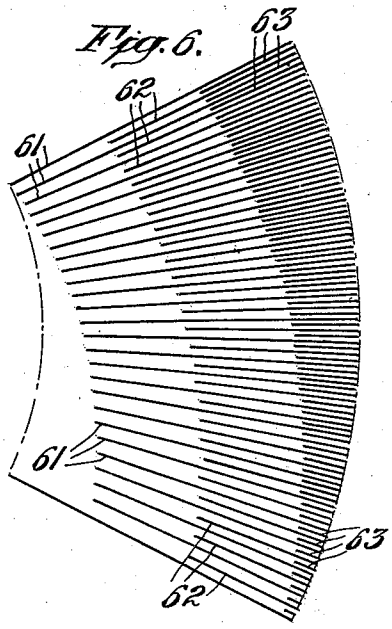


Fig. 6.



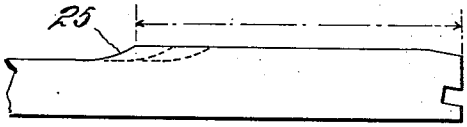
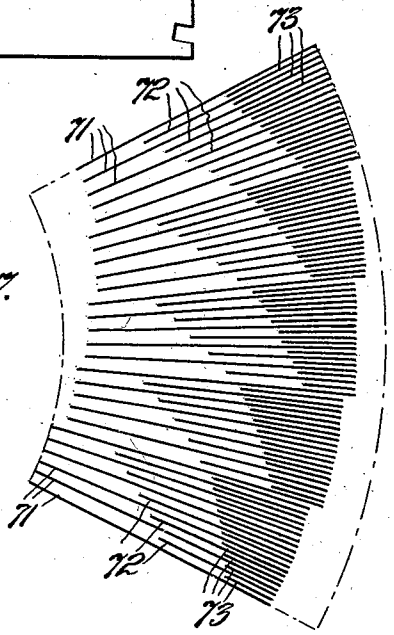


Fig. 8.

Fig. 7.



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JORDAN FILLING

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Application September 25, 1937, Serial No. 165,631

10 Claims. (Cl. 92—27)

This invention relates to paper making machinery and particularly to refining engines of the Jordan type.

An object of the invention is to provide such a refining engine with an improved filling having an increased working efficiency that remains substantially uniform throughout the useful life of the filling.

Another object is to provide such a filling that may be used for a longer time at continued efficiency.

The invention consists in an improved arrangement of the working bars, not only for the plug, but also for the shell, as will be more fully pointed out hereinafter.

The accompanying drawings illustrate several embodiments of the invention. In these drawings:

Figure 1 is a vertical longitudinal sectional view through the shell and plug of a Jordan engine embodying the present invention;

Figure 2 is a fragmentary vertical cross sectional view through a portion of the plug periphery showing the working bars and the woods therebetween;

Figure 3 is a diagrammatic layout view showing a total or partial development of one of the conical surfaces and illustrating a straight bar type of Jordan embodying the invention;

Figure 4 is a similar view illustrating the embodiment of the invention in a zigzag bar type Jordan member;

Figure 5 is a view similar to Figure 3 and may be taken as a total or partial development showing a modified form of bar arrangement, illustrating largely diagrammatically an arrangement of the effective working portions of the bars;

Figure 6 is a similar view of another arrangement;

Figure 7 is a similar view of a still further arrangement; and

Figure 8 shows a bar elevation.

The present invention is intended to reduce or eliminate certain disadvantages heretofore encountered in certain types of commercial Jordan engines. For example, any symmetrical spacing of full length bars of one of the conical surfaces has resulted in a wider spacing between adjacent bars near the cone base than at the small end of the cone. In the endeavor to construct a conical Jordan member with a more even bar spacing, additional bars of less than full length have been added to the conical member between the full length bars, the shorter bars extending from the cone base to a point some selected distance therefrom. After a few axial adjustments have been made, however, to take up the bar wear, it has been found that the bars opposing each other have been worn at points along their edges into a wavy or scalloped outline due to the circumferential wear from the inner ends of the groups of the short bars. Upon this occurrence the Jordan's efficiency is impaired for "grabbing" occurs and it is necessary to dismantle the engine and regrind or replace the bars.

The present invention aims to secure the advantages of more even bar spacing by the addition of less than full length bars, while at the same time securing increase in the operating life before dismantling is required.

Referring to Figure 1, a shell 11 is provided with a filling 13, herein illustrated as a three-part filling, although it will be understood that the invention is not limited to a specific number of filling parts. Within this conical filling rotates the plug 15 which is carried by shaft 17. It will be understood that relative axial adjustment of the stationary and movable parts provides for variation in the degree of refining effect and permits taking up to compensate for working bar wear. Fig. 2 shows a group of plug bars assembled on a plug by locking pins 18, the bars being spaced apart by the woods 20.

Referring particularly to Figure 3, the conical Jordan member, which may be either the plug or the shell, or both, is provided with a circumferential series of full length or substantially full length bars 31. In this figure the bar arrangement includes an intermediate series of bars 32 and a short series of bars 33. All the bars 32 may have the same actual overall length, and to secure the advantages of the invention, may be milled off at varying distances from their inner ends, as indicated at 25 in Figure 8.

Similarly all the short series bars 33 may have the same actual overall length and may be similarly milled off to varying distances from their inner ends. This milling off results in providing the various bars of the several series with varying effective working lengths, the inner effective ends of said bars, however, lying not in a circle about the cone such as to cause wear at that point, but within a conical zone including the effective working end of that bar which has the shortest effecting working length in that series and the effective working end of the longest bar in that series. The advantages of the invention are most fully realized when the points within the zone representing the location of the effective bar ends are distributed substantially

smoothly and continuously, and preferably evenly, across the said zone.

The short series bars 33 are similarly constructed and arranged, and as shown in the figure, the sequence of bars at the base of the cone, in the form here illustrated, is a bar of the long series, a bar of the short series, a bar of the intermediate series, a bar of the short series, repeated in that order.

The construction and arrangement illustrated diagrammatically in Figure 4 are the same as in Figure 3, the difference being that Figure 4 illustrates the invention embodied in a zigzag type of working member, whereas Figure 3 illustrates a straight bar type.

In Figure 5 the intermediate length series of bars 52 is composed of a plurality of similar groups and the short length series of bars 53 is composed of a plurality of similar groups. In this arrangement the full length bars extend from end to end of the conical member; the outer ends of the short series bars and the intermediate series bars extend to the cone base. In accordance with the invention, however, the effective bar ends of the intermediate series (not necessarily the actual bar ends) within the cone lie not in the circumference of a circle around the cone but are distributed across a conical zone of substantial width, and the same is true of the bars in the group forming the short series.

Referring to Figure 6, there is shown a series of long bars 61, a series of bars of intermediate length 62 and a short membered series of bars 63. The effective inner ends lie in points which, if joined, would form a spiral line around the conical working member. The series of bars of intermediate length have their ends similarly arranged, as do also the bars of the series of longest bars. It will be understood, however, that it is not essential that the effective inner bar ends of any series lie in an exact and continuous spiral; that is, the bars of a series do not necessarily have to be arranged circumferentially in the order of their increasing lengths. It is important, however, that the effective bar ends of a series lie in points distributed across a definite zone, and the more smoothly and evenly they are so distributed, the better will be realized the advantages of the invention.

Figure 7 shows a bar arrangement comprising a plurality of series 71, 72, 73, each formed of a plurality of similar groups of bars, each group of each series being axially offset from its corresponding adjacent group.

It will now be apparent that the present invention provides a construction in which the actual quantity of bar metal, measured circumferentially in any zone containing the distributed effective bar ends of a series, increases with increasing cone diameter, and furthermore increases gradually across the zone. The construction results in a more uniform and even bar wear, longer bar life before regrinding is required, more uniform working efficiency throughout the life of the bars, and the elimination of an objectionable "grabbing" effect hitherto encountered in constructions where the bars have worn unevenly into a wavy or scalloped formation.

What is claimed is:

1. A refining engine of the Jordan type including a pair of relatively rotatable conical working members, one within the other, each having a plurality of circumferentially arranged working bars, and at least one of said members having its bars arranged in a plurality of series, the members of one series being interspersed among the members of the other and being of effective lengths gradually decreasing progressively toward the base of the cone.

2. A refining engine of the Jordan type including relatively rotatable conical working members, one within the other, each having a plurality of circumferentially arranged working bars, at least one of said members having a bar arrangement providing a conical working zone within which the quantity of effective working bar metal measured circumferentially increases gradually toward the base of the cone, said bar arrangement including a long membered series of bars and a shorter membered series of bars, the members of the shorter series being interspersed among the members of the long membered series, and the members of the shorter series having their effective working ends within said zone terminating substantially continuously across said zone at gradually increasing distances from the zone base.

3. A refining engine of the Jordan type including relatively rotatable conical working members, one within the other, each having a plurality of circumferentially arranged working bars, at least one of said members having a bar arrangement providing a plurality of conical working zones within which the quantity of effective working bar metal measured circumferentially increases gradually toward the base of the cone, said bar arrangement including a long membered series of bars, a series of short bars and a series of bars of intermediate lengths, the members of the intermediate series being interspersed among the members of the long series, and the members of the short series being interspersed among the members of both the long and the intermediate series, the members of the intermediate series and the members of the short series having their effective working ends terminating in different conical zones, the bar ends in each zone being distributed substantially evenly thereacross and at gradually increasing distances from the zone base.

4. A refining engine of the Jordan type including relatively rotatable conical working members, one within the other, each having a plurality of circumferentially arranged working bars, at least one of said members having a bar arrangement providing a conical working zone within which the quantity of effective working bar metal measured circumferentially increases gradually toward the base of the cone, said bar arrangement including a long membered series of bars and a shorter membered series of bars, the members of the shorter series being interspersed among the members of the long membered series, and the members of the shorter series having their effective working ends within said zone terminating substantially continuously across said zone at gradually increasing distances from the zone base, a plurality of effective bar ends nearest an end of the conical working member being at increasing distances therefrom.

5. A refining engine of the Jordan type including relatively rotatable conical working members, one within the other, each having a plurality of circumferentially arranged working bars, at least one of said members having a bar arrangement providing a plurality of conical working zones within which the quantity of effective working bar metal measured circumfer-

entially increases gradually toward the base of the cone, said bar arrangement including a long membered series of bars, a series of short bars and a series of bars of intermediate lengths, the members of the intermediate series being interspersed among the members of the long series, and the members of the short series being interspersed among the members of both the long and the intermediate series, the members of the intermediate series and the members of the short series having their effective working ends terminating in different conical zones, the bar ends in each zone being distributed substantially evenly thereacross and at gradually increasing distances from the zone base, a plurality of effective bar ends nearest an end of the conical working member being at increasing distances therefrom.

6. A refining engine of the Jordan type including relatively rotatable conical working members, one within the other, each having a plurality of circumferentially arranged working bars, at least one of said members having a bar arrangement providing a conical working zone within which the quantity of effective working bar metal measured circumferentially increases gradually toward the base of the cone, said bar arrangement including a long membered series of bars and a shorter membered series of bars, the shorter membered series comprising a plurality of similar groups, the members of the shorter series being interspersed among the members of the long membered series, and the members of the shorter series having their effective working ends within said zone terminating substantially continuously across said zone at gradually increasing distances from the zone base.

7. A refining engine of the Jordan type including relatively rotatable conical working members, one within the other, each having a plurality of circumferentially arranged working bars, at least one of said members having a bar arrangement providing a plurality of conical working zones within which the quantity of effective working bar metal measured circumferentially increases gradually toward the base of the cone, said bar arrangement including a long membered series of bars, a series of short bars comprising a plurality of similar groups and a series of bars of intermediate lengths comprising a plurality of similar groups, the members of the groups in the intermediate series being interspersed among the members of the long series, and the members of the groups in the short series being interspersed among the members of both the long and the intermediate series, the members of the intermediate series and the members of the short series having their effective working ends terminating in different conical zones, the bar ends of the groups in each zone being distributed substantially evenly thereacross and at gradually increasing distances from the zone base.

8. A refining engine of the Jordan type including relatively rotatable conical working members, one within the other, each having a plurality of circumferentially arranged working bars, at least one of said members having a bar arrangement providing a plurality of conical working zones within which the quantity of effective working bar metal measured circumferentially increases gradually toward the base of the cone, said bar arrangement including a long membered series of bars, a series of short bars and a series of bars of intermediate lengths, the members of the intermediate series being so interspersed among the members of the long series, and the members of the short series being so interspersed among the members of both the long and the intermediate series that successive bars taken circumferentially are, in repeated order, a bar of the long group, a bar of the short group, a bar of the intermediate group and a bar of the short group, the members of the intermediate series and the members of the short series having their effective working ends terminating in different conical zones, the bar ends in each zone being distributed substantially evenly thereacross and at gradually increasing distances from the zone base.

9. A refining engine of the Jordan type including a pair of relatively rotatable conical working members, one within the other, each having a plurality of circumferentially arranged working bars, and at least one of said members having its bars arranged in a plurality of series, the members of one series being substantially of equal length, less than the length of the members of another series, and having reduced heights along varying portions of their lengths providing effective working bar ends lying within, and distributed substantially evenly across, a zone of the working member.

10. A refining engine of the Jordan type including a pair of relatively rotatable conical working members, one within the other, each having a plurality of circumferentially arranged working bars, and each of said members having its bars arranged in a plurality of series, the members of one series on each being interspersed among the members of the other thereon and being of effective lengths gradually decreasing progressively toward the base of the cone and their effective ends within the working area lying at points distributed across the conical zone including said ends.

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