

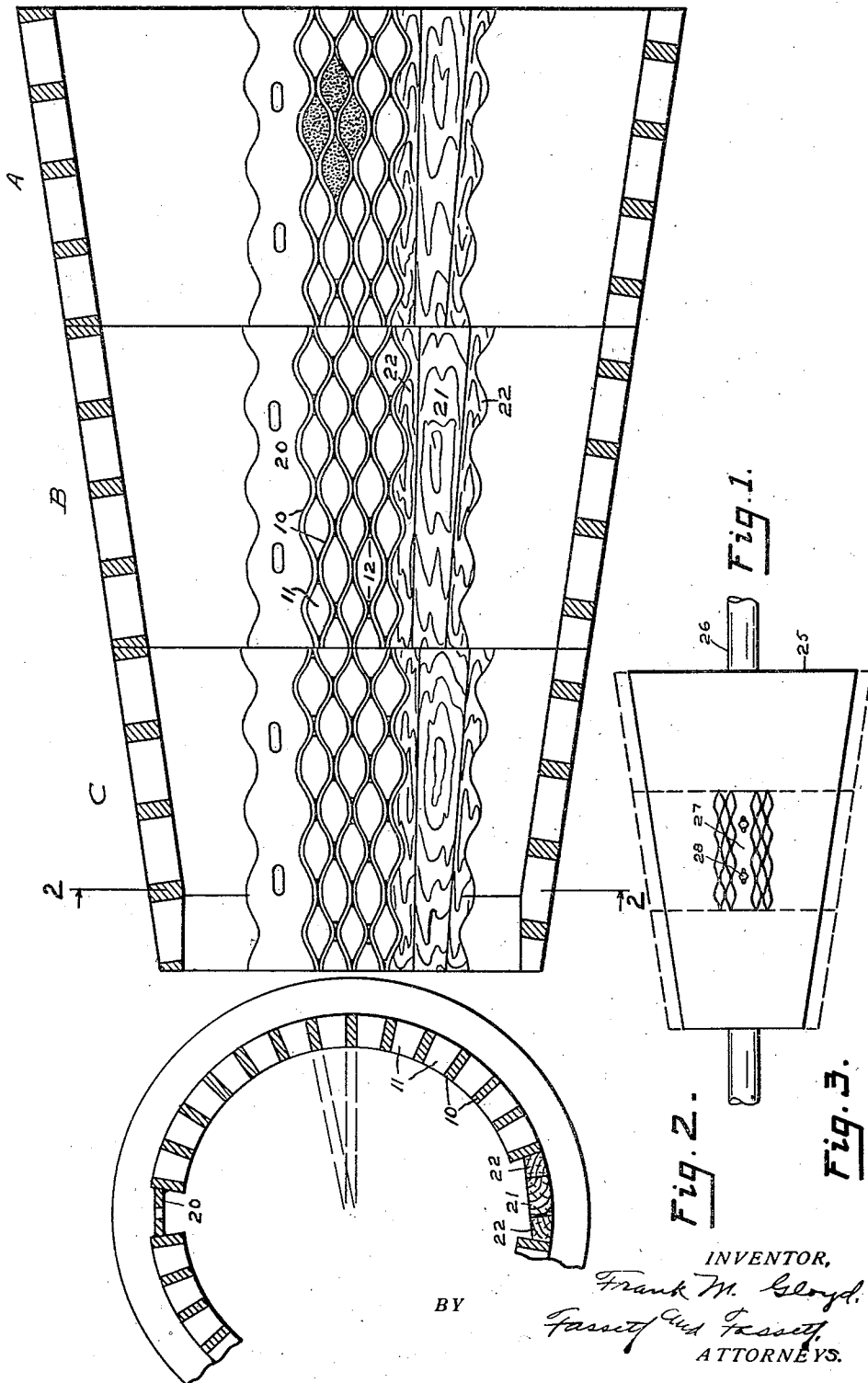
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SHELL LINING FOR JORDAN ENGINES

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SHELL LINING FOR JORDAN ENGINES

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This invention relates to shell linings for Jordan engines used for refining pulp in paper making.

As is well known, the Jordan engine comprises a casing or "shell", frusto-conical in form, mounted on legs or other supporting devices with its longitudinal axis horizontal. This shell is closed at both ends, and a rotatable shaft passes longitudinally through the casing, being supported in bearings at each end. On this shaft a frusto-conical core or plug is mounted within the shell, the periphery of the plug being armed or sheathed with specially designed devices or material. The function of which is to co-operate with the more or less similar sheathing which lines the frusto-conical interior wall of the shell. Pulp or "stuff" introduced into this shell at its small end, makes its way by the aid of centrifugal force to an outlet at the large end, being mechanically refined as it passes through.

My invention relates more particularly to improvements in the lining for the interior of the shell. The main object of the invention is to produce a shell lining wherewith a very superior quality of stuff can be produced. Another object is to produce a shell lining by which, with very slight modification, certain characteristics of the stuff can be changed. Still another object is to materially increase the output of a Jordan.

I shall now describe my invention in detail with the aid of the accompanying drawing, in which

Fig. 1 is a longitudinal sectional view of my improved shell lining, which view is to a considerable extent diagrammatic;

Fig. 2 is an end view, also diagrammatic, of the structure shown in Fig. 1; and

Fig. 3 is a view of a plug armed with a sheathing constructed in the manner of my improved shell lining.

Referring to Figs. 1 and 2 of the drawing it will be seen that the lining comprises a longitudinal series of three rings, marked respectively, A, B, C. Combined, these three rings form a complete lining, but as the rings are alike, except in diameter it will suffice if one ring be described in detail.

Each ring comprises a plurality of broad relatively thin corrugated metal bars 10, assembled side by side in a circular (arcuate) series. In this series contiguous, that is alternate, bars are corrugated reversely, so as to bring convex zones into contact and form longitudinal rows of rhomboidal cells 11. The contacting convexities are welded together, as at 12, thereby convert-

ing the several bars into an integer. As the shell is frusto-conical in form it is necessary to make the sections of the lining frusto-conical. This is done by making the corrugations in the bars 10 progressively smaller from one end to the other. 60 While there may be other ways of corrugating the bars, I prefer to corrugate them in a press, using dies that are made with the required gradual diminution in the size of the corrugations. Ordinarily, making the corrugations smaller 65 would mean reducing both their length and depth. This however, is not necessary, as they may be reduced in depth only, which, obviously, would produce the desired result.

Because of the circularity of the ring it is necessary, if the contacts between the convexities of the corrugations are to be co-extensive with the width of the bars, to make the corrugations progressively deeper from the inner to the outer edges of the bars. This is very easily done by so 70 constructing the corrugating dies that the metal is stretched simultaneously with the formation of the corrugations, sufficiently to produce the required angularity between the convexities at opposite sides of the bar. Making the contacts of 75 the convexities co-extensive with the width of the bars makes it easier to weld the bars together at their outer edges. Welding the bars at their outer edges is preferable to welding them at their inner edges, because it is easier to get 80 to them to weld them, and because the strength of the welds is not impaired as the inner edges wear away.

At one point in the series of bars a holding plate 20 is inserted and welded to the contiguous 90 bars. This plate is provided with slots for the reception of cap screws, whereby the ring may be anchored in the shell, principally to keep it from rotating. The circular series of corrugated bars does not form a complete ring, there being 95 a gap of sufficient width to receive a wedge 21 whereby to expand the ring in the shell. At each side of the wedge is a shim 22, one edge of which is scalloped to fit the adjacent bar and form a tapering space to receive the wedge. The 100 wedge and shims being made of wood, and being dry when the wedge is driven into place, become very tight when the wood becomes wet and swells. If desired other means may be employed in expanding the rings in the shell. Furthermore, the 105 rings may be made complete, that is, without the gap. In that case it is only necessary to anchor the rings to keep them from rotating in the shell.

Preferably, the cells 11 are more or less filled 110

with a non-metallic substance, depending upon the character of the effect it is desired to produce on the stuff being refined. If what is known in the paper-making art as a "brushing" effect is desired the cells should be entirely filled; if what is known as a cutting effect is desired, the cells should not be quite filled. For the cutting effect the cells might be left empty, but that would be undesirable in that the cells would become filled with stuff that would lie there inactive, with no way of getting it out. Filling the cells to within about one-eighth of an inch of the edges of the bars avoids this difficulty, while allowing the bars to produce the desired cutting effect.

While the cells 11 may be filled with wood, or what is known as "plastic-wood", I prefer to fill them with an abrasive material or composition. For this purpose I have found aluminous oxide bonded with a synthetic resin, such for example, as the resin known in the market as redmanol, satisfactory.

As is obvious, the small end of section A of the lining is equal in diameter to the large end of section B, and the small end of section B is the same in diameter as the large end of section C. While I might effect these successive differences in diameter by varying the depth of the corrugations I prefer to do it by using bars of the same size in all sections and varying the diameters of the sections by varying the number of bars in the sections. This results in gradually increasing the number of bars in proportion to the increasing volume of stuff being refined. That is, as the stuff gradually flows toward the large end of the casing the volume of stuff in a zone of given width becomes larger, and it is desirable that the number of bars acting on this increased volume of stuff should increase.

In addition to the advantages referred to in increasing the depth of the corrugations toward the wall of the shell, is the fact that the width of the cells increases correspondingly, thereby making it impossible for the blocks of filling material to fall out of the spaces after the lining sections are in place in the shell.

While I prefer to construct my improved shell lining in a plurality of longitudinally disposed units, I do not limit myself to this construction. If desired the lining may be made in a single unit as long as the combined length of the several units, the corrugated bars running continuously from one end to the other of the unit. While the wedge members 21 and 22 are shown on opposite sides of the ring from the fastening plate 20 in Fig. 2, they are shown near together in Fig. 1. It is rather immaterial which plan is used, although I prefer that shown in Fig. 2.

My improved shell lining is adapted to operate in connection with any of a number of types of rotating plugs. It is also adapted to operate in connection with a plug of substantially the same type as the lining. In Fig. 3 I show such a plug, comprising a frusto-conical core 25, rigidly secured to a shaft 26. Mounted on this core are a plurality of rings constructed with broad, relatively thin corrugated metal bars, similar to the rings A, B, C of Fig. 1. Preferably, these rings are made continuous, that is without gaps, and secured on the core by pressing them endwise until they become tight. At one or more places holding plates 27 are inserted in the rings and welded to contiguous bars, said plates being secured to the core with cap screws 28. The rhomboidal cells 29 may be left empty, especially where the Jordan is used for producing a cutting effect on

the stuff. No trouble will be experienced through stuff lying in the spaces, as centrifugal force will keep the stuff moving. However, if desired the cells may be more or less filled with wood or abrasive material, according to the character of result desired.

As is obvious, instead of making my core sheathing in two or more parts I can make it in one unit as long as the core 25.

While I prefer to weld the bars together in my shell lining and core covering, I do not limit myself to that manner of integrating the bars. If desired the bars may be riveted together, or they may be fastened together by other means.

It is not to be understood that I limit myself to the particular construction shown, as modifications in the construction, other than those referred to, are possible without departing from the spirit of my invention or exceeding the scope of my claims.

Having described what I regard as the preferred embodiment of my invention, I claim:

1. A shell lining for a Jordan engine, comprising a plurality of broad, relatively thin corrugated metal bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the contacting convexities being welded together to form an integer.

2. A shell lining for a Jordan engine, comprising a plurality of broad, relatively thin corrugated metal bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the contacting convexities being welded together to form an integer, the corrugations being progressively smaller from one end to the other of the bars, whereby said integer is given a frusto-conical form.

3. A shell lining for a Jordan engine, comprising a plurality of broad, relatively thin corrugated metal bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the contacting convexities being welded together to form an integer, the corrugations being progressively smaller from one end to the other of the bars, whereby said integer is given a frusto-conical form, said cells being more or less filled with a non-metallic material.

4. A shell lining for a Jordan engine, comprising a plurality of broad, relatively thin corrugated metal bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the corrugations being progressively deeper from the inner to the outer edges of the bars, thereby producing contacts between the convexities coextensive with the width of the bars, said convexities being welded together to form an integer, the corrugations being progressively smaller from one end to the other of the bars, whereby the integer is given a frusto-conical form.

5. A shell lining for a Jordan engine, comprising two or more frusto-conical rings adapted to be inserted end to end in the shell, each ring comprising a plurality of broad, relatively thin corrugated bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and

forming longitudinal rows of rhomboidal cells, the contacting convexities being welded together to form an integer.

6. A shell lining for a Jordan engine, comprising two or more frusto-conical rings adapted to be inserted end to end in the shell, each ring comprising a plurality of broad, relatively thin corrugated bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the contacting convexities being welded together to form an integer, the small end of one ring being the same in diameter as the large end of the next, this difference in diameter being obtained by increasing the number of corrugated bars in one ring.

7. A shell lining for a Jordan engine, comprising two or more frusto-conical rings adapted to be inserted end to end in the shell, each ring comprising a plurality of broad, relatively thin corrugated bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the contacting convexities being welded together to form an integer, the corrugations being progressively smaller from one end to the other of the bars, whereby said integer is given its frusto-conical form.

8. A shell lining for a Jordan engine, comprising two or more frusto-conical rings adapted to be inserted end to end in the shell, each ring comprising a plurality of broad, relatively thin corrugated bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the corrugations being progressively deeper from the inner to the outer edges of the bars, thereby producing contacts between the convexities coextensive with the width of the bars, said convexities being welded together to form an integer, the corrugations being progressively smaller from one end to the other of the bars, whereby the integer is given its frusto-conical form.

9. A shell lining for a Jordan engine, comprising two or more frusto-conical rings adapted to be inserted end to end in the shell, each ring comprising a plurality of broad, relatively thin corrugated bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the corrugations being progressively deeper from the inner to the outer edges of the bars, thereby producing contacts between the convexities coextensive with the width of the bars, said convexities being welded together to form an integer, the corrugations being progressively smaller from one end to the other of the bars, whereby the integer is given its frusto-conical form, a fastening plate being interposed between and secured to each of two bars, whereby to fasten the lining in the shell.

10. A shell lining for a Jordan engine, comprising a plurality of broad, relatively thin corrugated metal bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the contacting convexities being welded together to form an integer, a fastening plate being inter-

posed between and secured to each of two bars, whereby to fasten the lining in the shell.

11. A shell lining for a Jordan engine, comprising a frusto-conical ring adapted to be inserted in the shell, said ring comprising a plurality of broad, relatively thin corrugated bars assembled side by side in a circular series, contiguous bars being corrugated reversely thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the contacting convexities being welded together at the outer periphery of the ring to form an integer.

12. A shell lining for a Jordan engine, comprising a frusto-conical ring adapted to be inserted in the shell, said ring comprising a plurality of broad, relatively thin corrugated bars assembled side by side in a circular series, contiguous bars being corrugated reversely thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the contacting convexities being welded together at the periphery of the ring to form an integer, said ring having a longitudinal gap at one point adapted to receive a wedge whereby to expand the ring in the shell, and having a fastening plate interposed between and secured to each of two bars, whereby to anchor the ring and prevent it turning in the shell.

13. A refining sheathing for a Jordan engine, comprising a plurality of broad, relatively thin corrugated metal bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the corrugations being progressively deeper from the inner to the outer edges of the bars, thereby producing contacts between the convexities co-extensive with the width of the bars, said convexities being secured together to form an integer, the corrugations being progressively smaller from one end to the other of the bars, whereby the integer is given a frusto-conical form.

14. A refining sheathing for the plug of a Jordan engine, comprising a plurality of broad, relatively thin corrugated metal bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the corrugations being progressively deeper from the inner to the outer edges of the bars, thereby producing contacts between the convexities co-extensive with the width of the bars, said convexities being secured together to form an integer, the corrugations being progressively smaller from one end to the other of the bars, whereby the integer is given a frusto-conical form.

15. In a shell lining for a Jordan engine, comprising a plurality of broad, relatively thin corrugated metal bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the contacting convexities being united.

16. A shell lining for a Jordan engine, comprising a plurality of broad, relatively thin corrugated metal bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the corrugations being progressively deeper from the inner to the outer edges of the bars, thereby producing contacts between the

convexities co-extensive with the width of the bars, said convexities being welded together to form an integer.

17. A shell lining for a Jordan engine, comprising two or more frusto-conical rings adapted to be inserted end to end in the shell, each ring comprising a plurality of broad, relatively thin corrugated bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming longitudinal rows of rhomboidal cells, the contacting convexities being united.

18. A refining sheathing for the plug of a Jordan engine comprising two or more frusto-conical rings adapted to be secured to said plug end to end, each ring comprising a plurality of broad, relatively thin corrugated bars assembled side by side in a circular series, contiguous bars being corrugated reversely, thereby bringing convex zones into contact and forming rows of rhomboidal cells, the contacting convexities being united.

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