May 19, 1931. L. H. WESSEL ET AL 1,806,272

MACHINE FOR REFINING PAPER AND PULP

Filed July 10, 1928 2 Sheets-Sheet 1

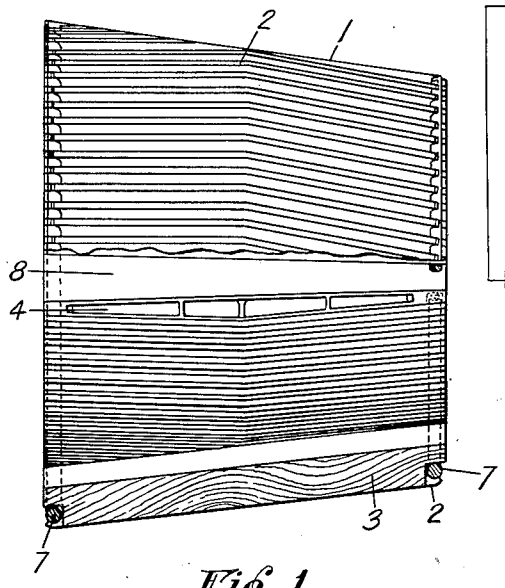


Fig. 1

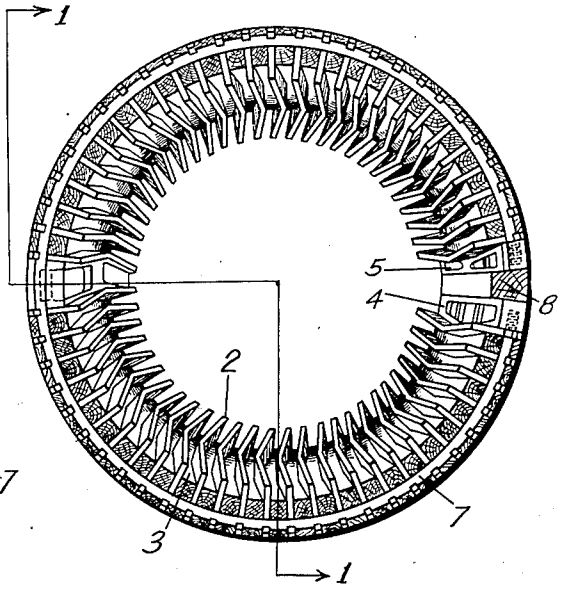


Fig. 2

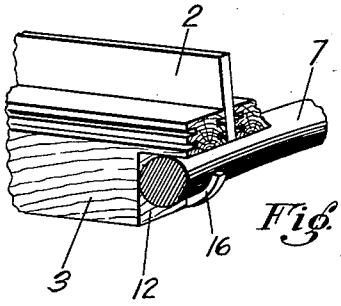


Fig. 3

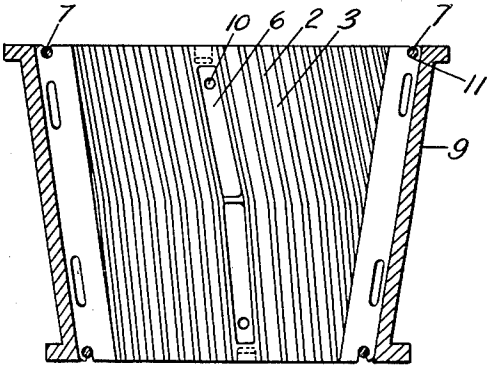


Fig. 4

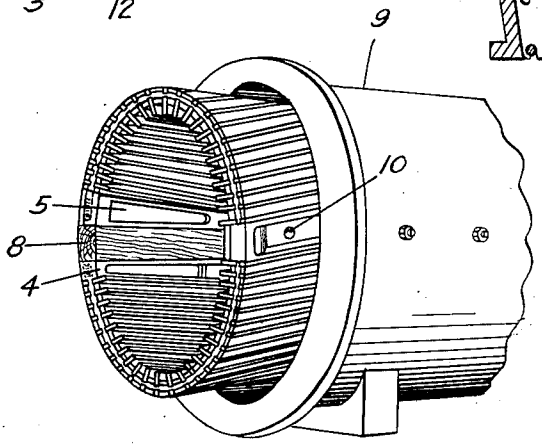


Fig. 5

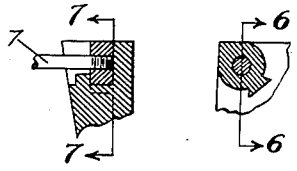


Fig. 6 Fig. 7

INVENTORS
Ludwig H. Wessel.
Homer N. Booker.

BY Edwin P. Coates
ATTORNEYS.

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MACHINE FOR REFINING PAPER AND PULP

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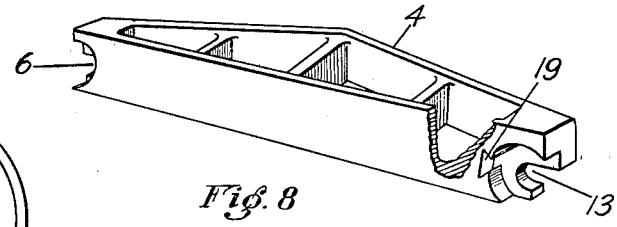


Fig. 8

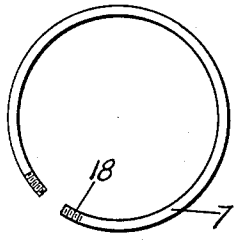


Fig. 14

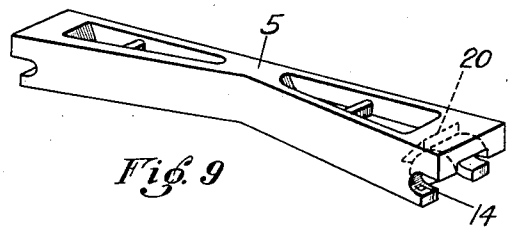


Fig. 9

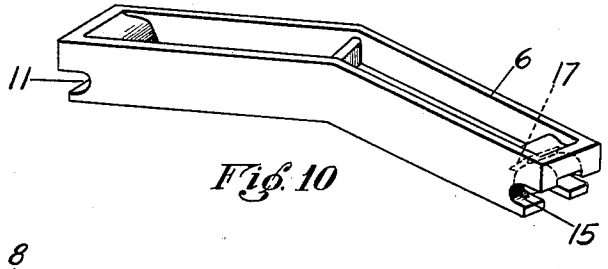


Fig. 10

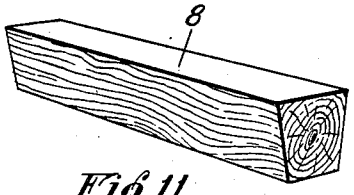


Fig. 11

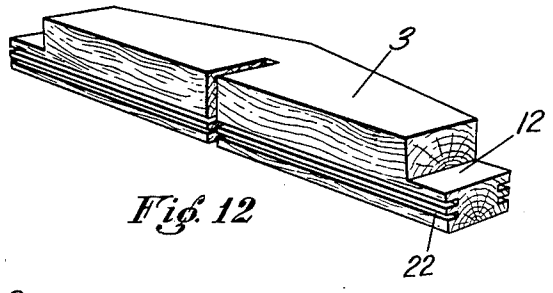


Fig. 12

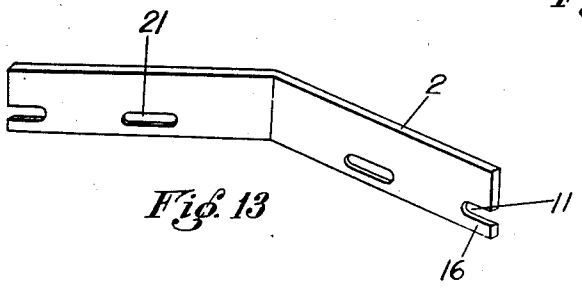


Fig. 13

INVENTORS
Ludwig H. Wessel.
Homer N. Booker.

BY Edwin P. Booker
ATTORNEYS.

Patented May 19, 1931

1,806,272

UNITED STATES PATENT OFFICE

LUDWIG H. WESSEL AND HOMER N. BOOKER, OF LANCASTER, OHIO, ASSIGNORS TO THE HERMANN MANUFACTURING COMPANY, OF LANCASTER, OHIO, A CORPORATION OF OHIO

MACHINE FOR REFINING PAPER AND PULP

Application filed July 10, 1928. Serial No. 291,626.

Our invention relates to machines for refining paper and pulp. It pertains, particularly, to that type of machine known as a Jordan engine and to that part of such machine commonly known as the shell liner or filling.

Generally speaking, a Jordan engine consists of a plug body of frusto-conical shape from whose outer periphery extend knives or cutting blades that are either mounted directly on the plug body or form a part of a shell or liner which covers the plug body. This plug with its outwardly extending knives or cutting blades, rotates within a shell or casing, also of frusto-conical form, whose interior is provided with a liner or filling that primarily consists of a series of inwardly projecting knives or cutting blades having suitable spacers between the bases thereof.

The respective outwardly and inwardly projecting knives or cutting blades are of such relative length that the outer or cutting edges thereof co-act with each other to mascerate, refine and hydrate paper stock which is passed through the machine from one end to the other. Since the plug body which carries the outwardly extending knives or cutting blades, rotates at a high rate of speed and the outer or cutting edges co-act with the cutting edges of the knives or the cutting blades projecting inwardly from the shell or casing, it will be readily seen that the inwardly projecting knives or cutting blades will ultimately become worn to such an extent as to no longer be useful as one element of a grinding machine.

In most instances, the replacement of worn out knives or cutting blades and their spacers has taken place in the paper mill, the shell or casing either being removed from its supports, placed in a vertical position, and each knife and spacer individually replaced, or each knife and spacer individually replaced or replaced in sections while the shell or casing is on its supports and in its original position. In either event, the replacement of the worn out shell filling has required that the entire machine be out of operation during the time that it would take to replace the knives or cutting blades and the spacers. However, in some instances, shell or casing fillers or liners have been entirely assembled in a machine shop and then shipped as an entity to the paper mill but such assemblage in the machine shop has been an operation involving much time and labor, thereby increasing the cost of the shell liners or fillings. Further, these shell liners or fillings have not been entirely satisfactory from the standpoint of rigidity of the filling or liner.

One object of our invention is to provide a shell or casing filler or liner which can be completely built up in the machine shop in a minimum of time and at a minimum expense and then shipped to the mill where it is to be used.

Another object of our invention is to provide a means for holding a plurality of knives or cutting blades and their spacers or separators in such position as to form a complete shell liner or filling that may be substituted as an entity for the worn out filling or liner already in the machine and to make the shell liner or filling as nearly rigid as possible.

Other objects of our invention may be seen in the following description and the preferred embodiment of our invention may be seen in the accompanying drawings wherein similar characters of reference designate corresponding parts and wherein:

Figure 1 is a side view shown in partial section on the line 1—1 of Figure 2 showing the preferred embodiment of our invention.

Figure 2 is an end view of a shell liner or filling constructed in accordance with our invention.

Figure 3 is a perspective view of a detail including a knife or cutting blade, wood spacers or separators on either side thereof, and a means employed to hold a plurality of these knives and separators in assembled relation.

Figure 4 is a side view, partly in section, showing a series of knives or cutting blades and spacers or separators disposed in a jig preparatory to being secured together.

Figure 5 is a perspective view showing a

completed shell liner or filling partially inserted in a shell or casing.

Figure 6 is a sectional view taken on the line 6—6 of Figure 7 showing the means for securing the ends of the ring clamp used for holding the various parts of the filler or liner in assembled relation.

Figure 7 is a sectional view taken on the line 7—7 of Figure 6.

Figure 8 is a perspective view, with parts broken away, of one of the pieces used for squaring up the ends of the shell liner or filling at the point where it is split.

Figure 9 is a perspective view of another piece adapted to a similar use as that piece shown in Figure 8.

Figure 10 is a perspective view of the anchor bar.

Figure 11 is a perspective view of the wedge block which we employ.

Figure 12 is a perspective view of a spacer or separator block which is placed in alternate relation with each knife or cutting blade.

Figure 13 is a perspective view of a knife or cutting blade.

Figure 14 is a view of the ring clamp which we employ in holding the parts of our shell liner or filling in assembled relation.

Referring to the drawings and particularly to Figures 1 and 2, we have shown a casing or shell filler 1 of frusto-conical shape corresponding to the frusto-conical shape of a shell or casing in which it is adapted to be disposed. In order to facilitate the handling of the filler and to increase the strength thereof we preferably construct the filler of a number of relatively short units, only one of which is shown. Each separate unit is made up, primarily, of a plurality of knives or cutting blades 2 and spacers 3 which may be of any suitable material although they are preferably of wood. These wood spacers are adapted to be alternately disposed with the knives or cutting blades in a frusto-conical filler.

Each separate unit of the shell or casing filler 1 further consists of the various parts shown in Figures 8 to 14, inclusive, of the drawings. These various parts are respectively male and female bars 4 and 5, an anchor bar 6, ring clamp 7, and a wedge 8.

In Figure 4 of the drawings, we have shown the method which we employ in assembling these hereinbefore named parts into a filler or liner unit so that the result will be a section of a shell or casing liner or filler of substantially a frusto-conical shape. This is accomplished by the use of frusto-conical forms or jigs which are provided in various sizes or are made adjustable to provide for the assembly of various frusto-conical sections and are of substantially the same diameter across their inner surface and taper the same as the shell or casing in which the finished unit of filler or liner is to be used.

In assembling the various parts to produce a frusto-conical filler or liner unit we first place the anchor bar 6 in the form or jig 9 in the manner shown in Figure 4. The anchor bar may be secured to the inner surface of the form or jig by inserting bolts through the bolt holes 10 of the anchor bar and through complemental holes in the wall of the form or jig. Then, the desired number of alternate knives 2 and spacers 3 are placed around the inner surface of the form or jig 9. It will be understood that the alternate knives or cutting blades and spacers extend around the inner surface of the form or jig 9 from opposite sides of the anchor bar. When sufficient alternate knives or cutting blades and spacers have been placed in the form or jig 9, the male and female bars 4 and 5 are placed against the respective last spacers that were inserted into the form or jig and the wedge 8 is driven between the complemental sides of these respective male and female bars 4 and 5. Such wedge serves the purpose of wedging the knives or cutting blades and the spacers tightly against one another and against opposite sides of the anchor bar 5.

In order to secure the various hereinbefore named parts in their tightly wedged position, we have provided split ring clamps 7 which vary in circumference so as to be adapted for use on the larger and smaller end of each frusto-conical filler or liner unit and to provide a place for such ring clamps 7, grooves 11 are disposed in each end of the respective knives or cutting blades and near the inner edge of the knives for a reason hereinafter apparent. Likewise, the spacers 3 have been provided with cut away portions 12 on each end thereof. We have further provided dove-tail grooves 13 and 14 in the male and female bars 4 and 5 and a dove-tail groove 15 in each end of the anchor bar 6.

When the various parts of the frusto-conical shell or liner unit have been placed in the form or jig 9 in the manner hereinbefore described, the grooves 11 in the opposing ends of each respective knife or cutting blade 2, the dove-tail groove 15 in the anchor bar 5 and the cut away portions 12 of the spacers 3 will coincide to form a continuous depression from the last spacer block on one side of the anchor bar 5, to and through the last spacer block on the other side of the anchor bar.

The grooves 11 being in a position near the bottom edge of each knife or cutting blade form relatively narrow portions 16 on each end of each knife or cutting blade, and, after the split ring clamps 7 have been driven into the continuous depression here-

inbefore described, these portions 16 are bent over the respective ring clamps in the manner shown in Figure 3. Such bending of the portions 16 around the ring clamps 7 will effectively prevent relative longitudinal or vertical movement of the knives while the spacers 3, anchor bar 6 and the bars 4 and 5 will be effective to prevent any lateral movement of the knives or cutting blades. The cut away portions 12 of the spacers 3 and their position between the knives or cutting blades 2 prevent any longitudinal movement of these spacers. Thus any movement of any part of the assembly with relation to any other part thereof is effectively, efficiently and economically prevented. At this time, the entire continuous depression or merely the dove-tailed grooves in the anchor bar 6 and the end bars 4 and 5 is filled with a melted material or other suitable means to secure the ring clamps therein or the ring clamps may be other wise secured to the anchor bar 6 and the end bars 4 and 5.

The grooves 15 in the opposing end of the anchor bar 6 are of dove-tail construction and when a fusible metal or melted material is poured into such grooves around the ring clamp 7, it will fill the dove-tail portion 17 of these grooves. Upon hardening, such fusible metal or melted material will serve to immovably secure the ring clamp 7 to each end of the anchor bar.

As hereinbefore described, the male and female bars are provided with the respective dove-tail grooves 13 and 14 (see Figures 8 and 9) in their respective opposing ends, also, as will be seen by referring to Figures 2, 5, 6 and 14, the ring clamps 7 have threads 18 generated on their respective ends.

When fusible metal or melted material is poured into these dove-tail grooves 13 and 14 around the threaded ends 18 of the ring clamp 7, such fusible metal or melted material will take substantially the form of a nut which has a part thereof disposed in the portions 19 and 20 of the grooves. It will be apparent, that the hereinbefore described holding means will effectively prevent movement of any part of the frusto-conical liner or filler when the wedge 8 is removed from between the male and female bars 4 and 5 and a shell or filler removed from the jig 9.

Referring to the drawings and the preceding description it will be seen that we have provided a frusto-conical shell or filler unit for the outer casing of a Jordan refining engine which embodies numerous advantageous features. For instance, it will be apparent that we have provided a shell or filler which may be assembled in a machine shop or factory in a minimum of time and with a minimum amount of labor and may be transported from one place to another as an entity and finally inserted in the casing of a Jordan engine as a replacement.

It will also be apparent that by providing longitudinal slots 21 in each respective knife or cutting blade, we provide a means for preventing slippage of the spacers or separators 3 with relation to the knife since, when water is applied to the spacers or separators, they will be caused to swell to such an extent that a portion thereof will enter the longitudinal grooves 21 in the knives.

It will further be apparent that we have provided longitudinal grooves 22 in each side of the respective spacers 3 and near the top thereof. Referring to Figure 3 of the drawings, it will be apparent that when the knives or cutting blades 2 become worn in too close proximity with the top of the spacers or separator blocks 3, the spacers or separator blocks may be chipped away and lowered a distance of one of the grooves 22 so that the knives or cutting blades may be further used prior to renewal.

Having thus described our invention, what we claim is:

1. The method of securing a plurality of knives in such relative position as to form a hollow shell which comprises assembling the knives in a form or jig and bending a portion thereof over a ring clamp.

2. The method of securing a plurality of knives in such relative position as to form a shell which comprises assembling the knives in a form or jig, bending a portion of each knife around a split ring clamp and then securing the ends of the split ring clamp in such manner as to prevent relative movement of the knives and the ring clamp.

3. In a paper refining machine, a liner or filler for the shell or casing of such machine embodying a plurality of projecting knives and spacers therefor, means for securing these knives and spacers in such relative positions that a plurality thereof will form a liner or filler, and means comprising an anchor bar having a dove-tail groove in each end thereof, split ring clamps adapted to interfit with the grooves in the ends of the knives, cut away portions in the ends of the spacers and the grooves in the opposing ends of the anchor bar, and means for securing said ring clamps in such grooves.

4. In a paper refining machine, a liner or filler for the shell or casing of such machine embodying a plurality of projecting knives and spacers therefor, means for securing these knives and spacers in such relative positions that a plurality thereof will form a liner or filler, and means comprising an anchor bar having a groove in each end thereof, split ring clamps adapted to interfit with the grooves in the ends of the knives, cut away portions in the ends of the spacers and the grooves in the opposing ends of

the anchor bar, means for securing said ring clamps in such grooves, end bars, and means for securing the ends of the split ring clamps to such bars.

In testimony whereof we hereby affix our signatures.

LUDWIG H. WESSEL.
HOMER N. BOOKER.