No. 818,494. PATENTED APR. 24, 1906.

S. R. WAGG.

REFINING ENGINE.

APPLICATION FILED JUNE 24, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

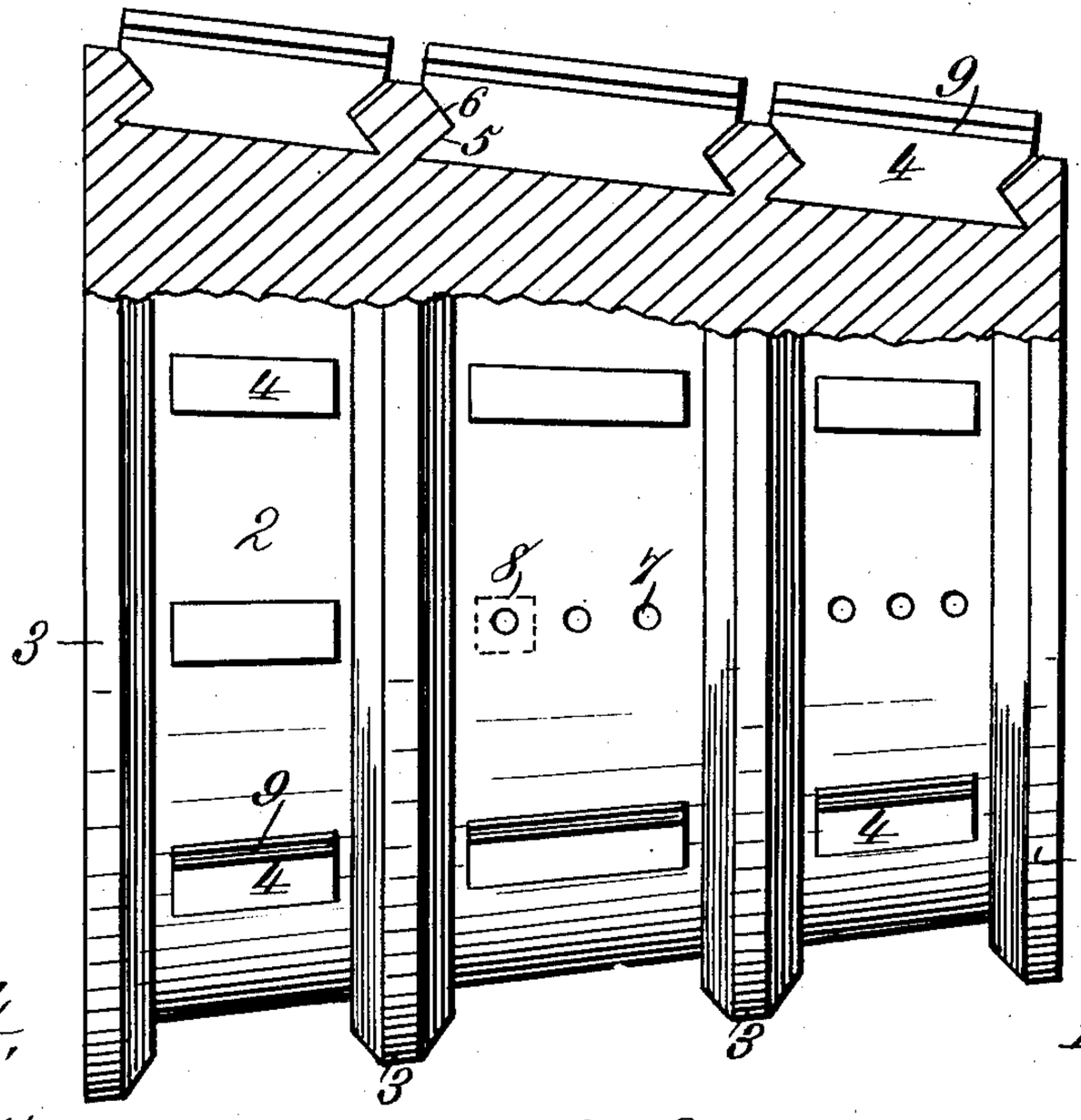


Fig. 4.

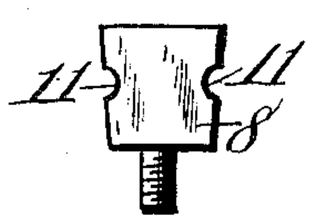
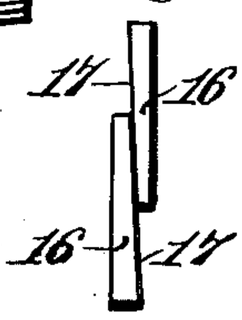
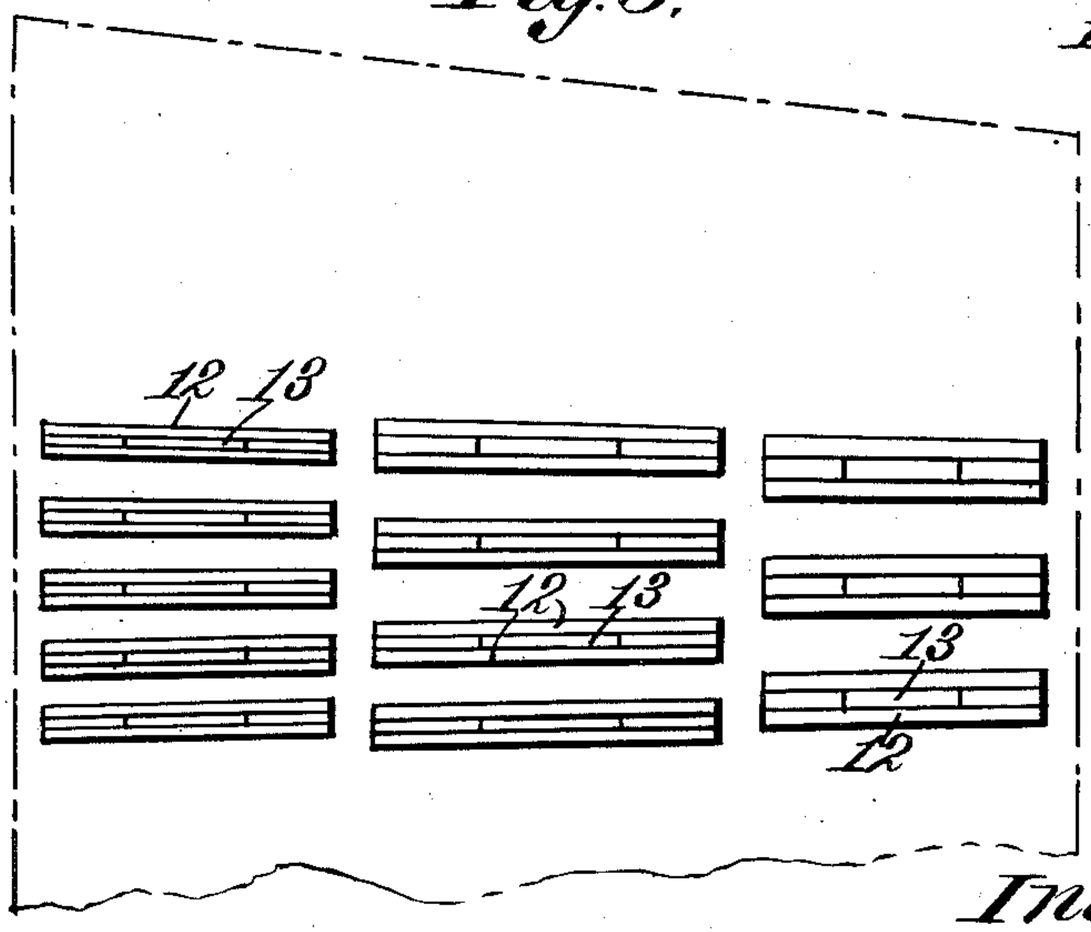


Fig. 3.

Fig. 5.





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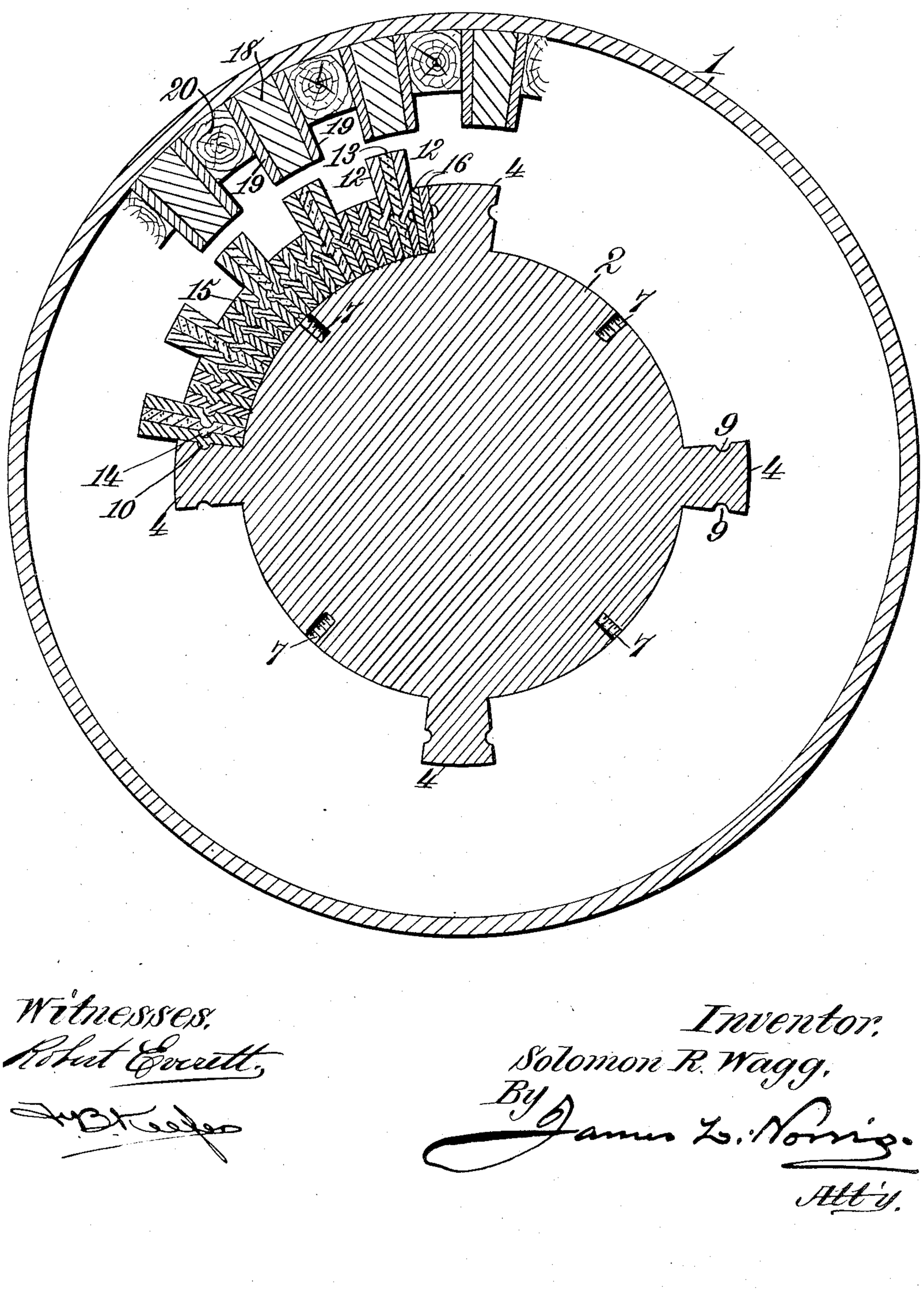
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

SOLOMON R. WAGG, OF APPLETON, WISCONSIN.

REFINING-ENGINE.

No. 818,494. Specification of Letters Patent. Patented April 24, 1906.

Application filed June 24, 1903. Serial No. 162,934.

To all whom it may concern:

Be it known that I, SOLOMON R. WAGG, a citizen of the United States of America, residing at Appleton, in the county of Outagamie and State of Wisconsin, have invented certain new and useful Improvements in Refining-Engines, of which the following is a specification.

This invention relates to certain new and useful improvements in refining-engines adapted to have assembled around the plug and around the interior of the shell groups of bars, at least one bar in each group being of stone, and has for its objects an improved construction of the plug to adapt the bars to be readily secured in position thereon, to provide a novel manner of securing and arranging the stone bars around the interior of the shell, to provide a novel construction and arrangement of bars around the plug of the engine, and to provide novel means for wedging the bars in position on the plug.

In addition to the above-stated broad objects of the invention minor objects relate to certain details of construction and to combinations and operations of parts, all of which will be more clearly apparent from the specification to follow.

That which I claim as my invention will be specifically indicated in the claims following the specification.

In order that my invention may be clearly understood, I have illustrated the same in the accompanying drawings, in which—

Figure 1 is a sectional elevation of the plug of a refining-engine constructed according to my invention. Fig. 2 is a cross-sectional view through the plug and shell of the engine. Fig. 3 is a plan view of a portion of the plug, showing the novel manner of arranging a series of blades thereon. Fig. 4 is a detail view of a tap-bolt, and Fig. 5 is a detail view of two wedges employed in securing the bars firmly in position between two ribs of the plug.

Referring now to the drawings, 1 indicates the shell, and 2 the plug, of the engine. The shell is of the ordinary construction. The plug however, has a special construction, which will now be indicated.

3 indicates a series of rings extending around the plug at intervals, four of such rings being shown in the drawings.

4 indicates a series of ribs between which the bars are assembled on the plug.

The rings 3 and the ribs 4 are preferably formed integral with the plug. The plug as a whole is provided with said rings and ribs by means, respectively, of a lathe and planer; but the manner of making the plug forms no part of this invention. The plug 2, as is usual in Jordan engines, is in the shape of a frustum of a cone, and a larger number of the ribs 4 are provided at the larger end of the plug than at the smaller, it being understood, of course, that the ribs 4 are placed at intervals, preferably equidistant, around the entire circumference of the plug. The rings 3 are provided with undercut edges 5, forming recesses, and the outer sides of the rings are correspondingly inclined, the construction being such that the opposing edges of the rings form annular pointed projections, which are adapted to fit correspondingly-shaped recesses 6, formed in the ends of the blades assembled about the plug. The ribs 4, it will be noticed, do not extend from one ring to the other, but a suitable space is left between the ends of each rib and the adjacent rings, and this construction insures a very much lighter plug than would be the case if the ribs extended the entire space between the respective rings, besides allowing the rings to be machine-finished.

It will be noted that between certain of the ribs I have shown a series of screw-threaded apertures 7, formed in the plug 2, and these apertures are for the purpose of receiving tap-bolts 8, one of which is shown in detail in Fig. 4. These tap-bolts are for the purpose of supplying the place of a rib 4, if for any reason more than the number of ribs provided should be required or desired in any particular section of the cone, or said tap-bolts can be used entirely around the plug in place of ribs. The ribs 4, as shown in Fig. 2, may be provided on opposite sides with grooves 9, each of which is adapted to receive a corresponding tongue 10, formed on the side of the blade adjacent to the rib, and the tap-bolts 8 may be provided on opposite sides with corresponding grooves 11 for a similar purpose. In using the tap-bolts two or more of such bolts would be employed and arranged in line to form a substitute for a rib.

In accordance with this invention I design to arrange a series of groups of bars between each two ribs of the plug, and each of these groups of bars may consist of one or more bars of a suitable material and a bar of stone. As shown in the drawings, each group consists of two bars and an interposed bar of

stone. The outer bars of each group are indicated by 12, and these bars may be of metal or wood or of any other preferred material. The intermediate stone bar is indicated by 13, and each of said bars may be provided on one side with a tongue 10 and on its opposite side with a corresponding groove 14, so that the various bars may interlock when in position on the plug, as clearly shown in Fig. 2. The groops of bars are separated by means of interposed spacing-bars 15, of metal, wood, or any other preferred material, which may be also provided with tongues and grooves corresponding to those on the cutting bars or blades. It will be seen that this construction permits of great latitude in the distance apart at which the groups of blades are spaced around the plug and also in the thickness of blades employed, in the number of blades employed in each group, and in the number of groups of blades arranged between any two ribs. In grouping the blades about the plug I provide for leaving a slight space between one of the ribs and the adjacent group of blades, and this space is adapted to receive the wedges 16, (shown in detail in Fig. 5,) which wedges, as shown, have two opposing inclined faces 17, so that when one of the wedges is inserted in position and the other wedge driven home the result will be that the various cutting-bars and spacing-bars will be forced together and locked in position on the plug. Any open space may be filled with molten brimstone.

It is well known that thick bars do not produce as fine a quality of paper as thin bars, while at the same time thick bars are desired for the initial treating of the stock as it enters the engine. According to my invention, therefore, I provide relatively thick bars at the smaller end of the plug, which of course is located at the inlet end of the engine, and gradually decrease the thickness of these bars, so that at the larger end of the plug, where the stock leaves the engine, the bars will be relatively thin, and thus I secure the beneficial result of having thick bars for treating the coarse stock as it enters the engine and thin bars for finishing the stock as it leaves the engine. This construction and arrangement of the bars is clearly shown in Fig. 3.

In addition to decreasing the thickness of the bars as they approach the outlet end of the engine it is also an object of my invention to provide stone bars 13 of different degrees of fineness—that is to say, the stone bars at the inlet end of the engine will be of relatively coarse grain, the bars in the next section will be of finer grain, and the bars in the last section of still finer grain.

I may employ a single stone bar 13 between two metal bars 12, or I may provide between each pair of metal bars 12 a stone bar composed of several sections, and each of these sections will be of successively finer grain, beginning at the inlet end of the machine.

I employ the word "stone" herein in a generic sense to cover natural stone or artificial compositions resembling stone. The material which I prefer to employ is carborundum. This is manufactured of varying degrees of fineness, which are denoted by suitable numbers, as No. 20, No. 30, No. 40, &c. As shown, therefore, by Fig. 3, beginning at the smaller end of the plug the first section of the stone blade between the metal blades 12 will be of No. 20 carborundrum, the next section of No. 30, and the next section of No. 40. In the next section of blades I will begin with No. 50 and continue through this and the succeeding sections successively with Nos. 60, 70, 80, 90, and 100, No. 100 carborundrum being relatively very fine with respect to No. 20. I thus secure the advantage of having a stone of coarse grain to work on the coarse stock as it enters the machine and of having bars of successively less degrees of coarseness to work on the stock as it nears the finishing stage, while at the outlet end of the engine the plug is provided with stone bars of very fine grain to impart the necessary finish to the stock.

In order to insure the free entrance of the stock into the engine and its rapid reduction, I find it advantageous to space the groups of bars at the smaller end of the plug at a comparatively great distance apart, while in the succeeding sections of the plug they are spaced at successively less distances apart. This construction is also shown by Fig. 3. The advantages resulting from this arrangement are that the stock as it enters the machine is comparatively hard to work, and thus a fewer number of blades are provided, requiring less horse-power per engine, but as the stock passes through the machine it becomes more and more reduced, and the number of blades is correspondingly increased until the finishing end of the engine is reached, where the maximum number of blades is employed to finish the stock. This provides for the gradual reduction of the stock and, as stated, will result in a great saving of horse-power, while permitting the engine to run at a high rate of speed and insuring the ultimate production of a very fine strong grade of paper.

Referring to the manner of securing the bars about the plug, it will be seen that I provide for their easy removal in case it is required to renew any of the bars, as it is only necessary to knock the wedges 16 out of place, when all the bars or any one of them can be readily removed.

Referring to Fig. 2, I have illustrated the manner of arranging stone bars about the interior of the shell. By this construction I place at the sides of each stone bar 18 wooden

bars 19 and I space the bars 18 the requisite distance apart by means of wedge-blocks 20, inserted between two wooden bars 19. The purpose of the wooden bars 19 is to prevent crumbling or breaking of the edges of the stone bars 18.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a refining-engine, a plug provided around its periphery with a series of longitudinally-disposed ribs, a series of blades inserted between the adjacent ribs, and a pair of wedges inserted in the space between two ribs and having opposing inclined faces.

2. In a refining-engine, a plug provided around its periphery with a series of groups of two or more blades, one of said blades being of stone.

3. In a refining-engine, a plug provided around its periphery with a series of groups of blades, each group comprising one or more metal bars and a stone bar.

4. In a refining-engine, a plug provided around its periphery with a series of groups of three blades, the middle blade being of stone.

5. In a refining-engine, a plug having a series of bars thereon said bars gradually decreasing in thickness from one end of the plug toward the other.

6. In a refining-engine, a plug having a series of groups of two or more bars thereon one of said bars being of stone, said stone bars being of successively less degrees of coarseness from one end of the plug toward the other.

7. In a refining-engine, a plug having a series of groups of three bars thereon, the intermediate bar being of stone, said stone bar being of successively less degrees of coarseness from one end of the plug toward the other.

8. A refining-engine having its blades arranged in a series of groups of two or more bars, one of said bars being of stone, said stone bars being of successively less degrees of coarseness from one end of the engine toward the other.

9. In a refining-engine, a plug having a series of groups of two or more bars arranged thereon, one of said bars being composed of sections of stone, the groups of bars extending from end to end of the plug and the stone sections being of successively less degrees of coarseness from one end of the plug toward the other.

10. A refining-engine having its blades arranged in a series of groups of three bars, the intermediate bar being composed of sections of stone, the groups of bars extending from end to end of the engine and the stone sections being of successively less degrees of coarseness from one end of the plug toward the other.

11. In a refining-engine, in combination with the plug having blades arranged thereon, a shell having a series of stone bars arranged around its interior, each of said stone bars having wooden bars at its sides, and a wedge-block inserted between successive pairs of wooden bars for spacing the stone bars the requisite distance apart.

12. A refining-engine having stone bars, said bars gradually decreasing in coarseness from one end of the engine toward the other.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

SOLOMON R. WAGG.

Witnesses:
GEO. H. PEERENBOOM,
C. S. DICKINSON.