No. 722,060. PATENTED MAR. 3, 1903.

S. R. WAGG.

REFINING ENGINE.

APPLICATION FILED MAR. 24, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

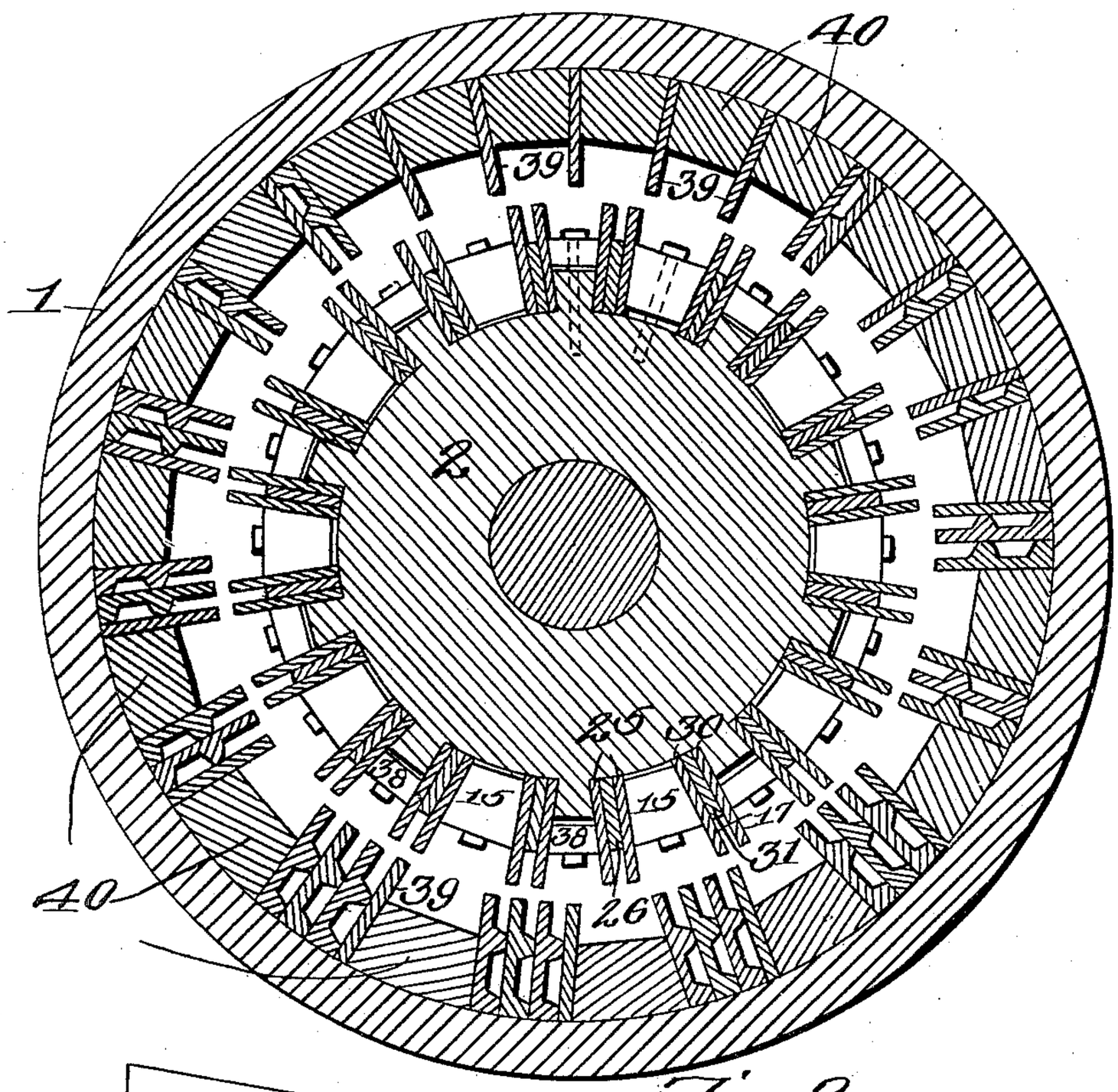
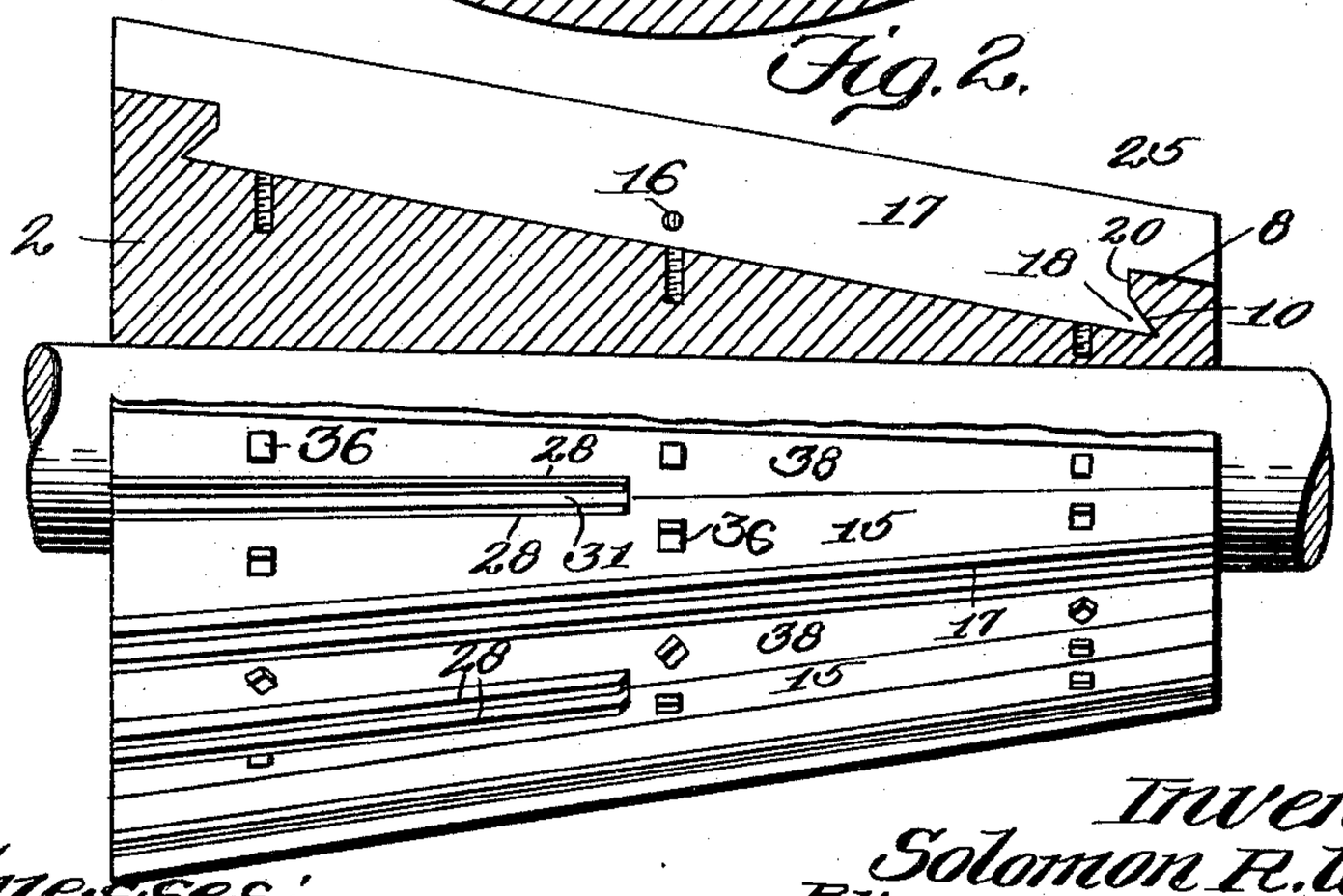


Fig. 2.



Witnesses:
C. D. Kesler.
James L. Norris, Jr.

Inventor
Solomon R. Wagg.
By James L. Norris.
Atty.

No. 722,060. PATENTED MAR. 3, 1903.

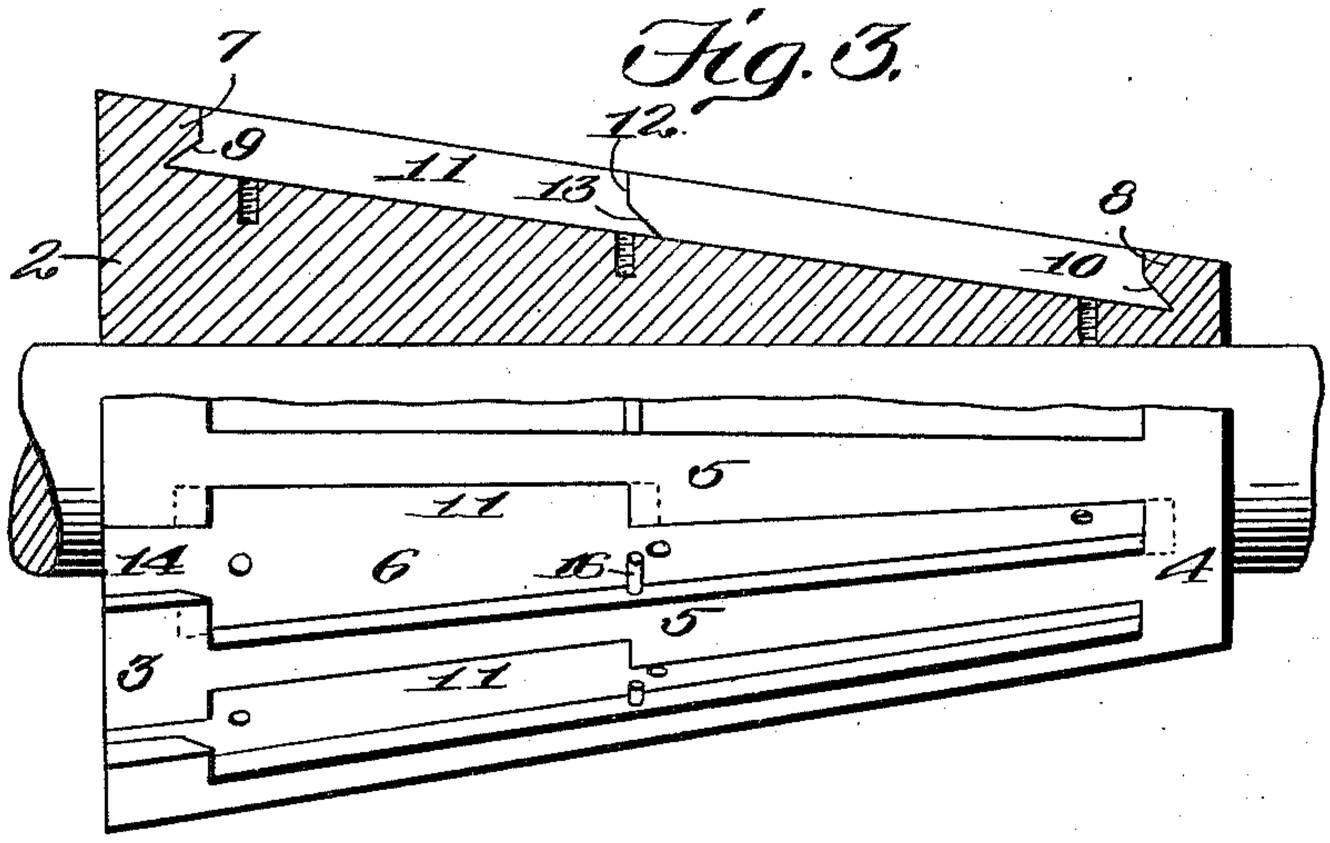
S. R. WAGG.

REFINING ENGINE.

APPLICATION FILED MAR. 24, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.



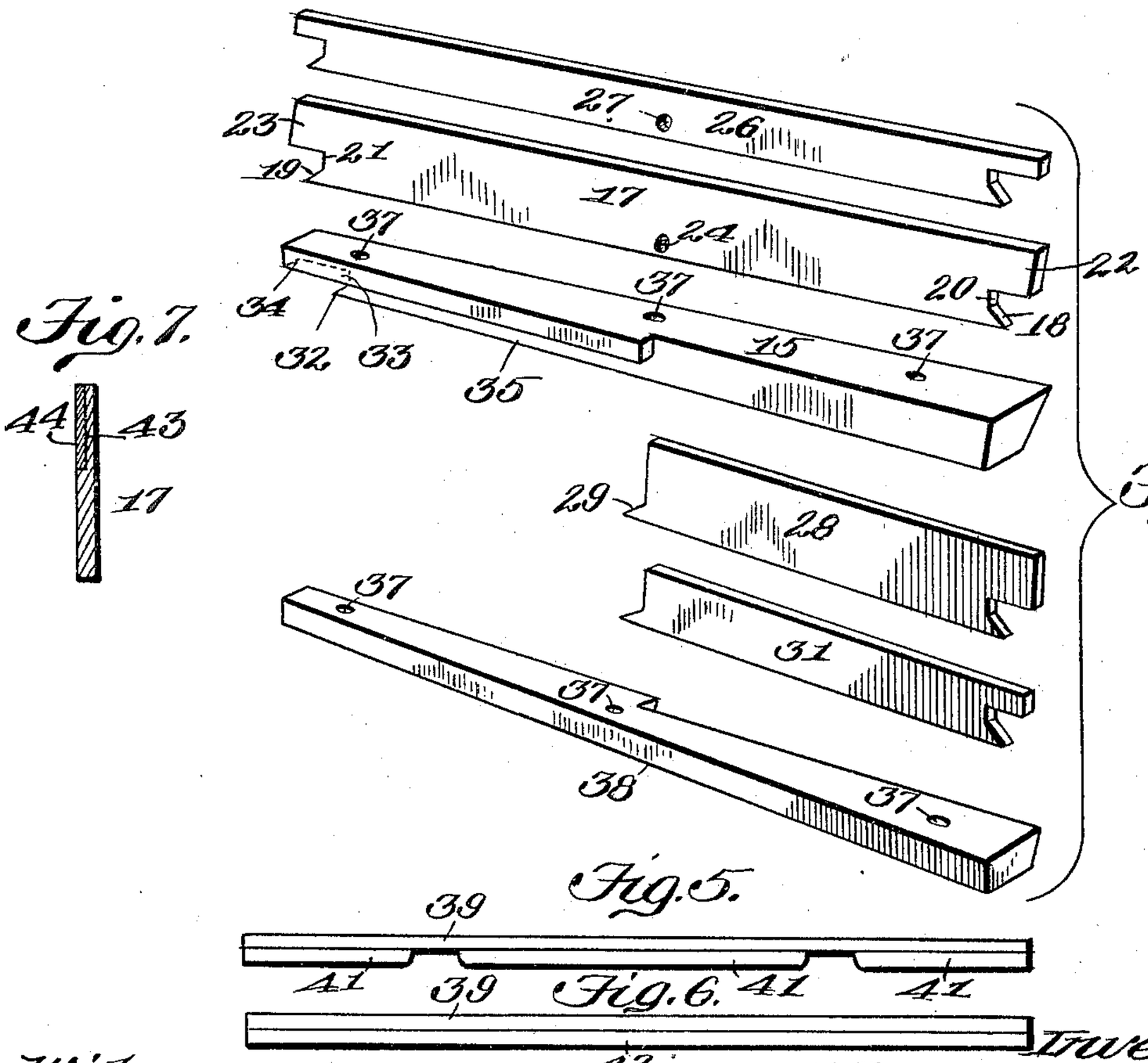


Fig. 7.

Fig. 4.

Fig. 5.

Fig. 6.

Witnesses:
Geo. D. Kesler.
James L. Norris, Jr.

Inventor
Solomon R. Wagg.
By James L. Norris.
Atty

UNITED STATES PATENT OFFICE.

SOLOMON R. WAGG, OF APPLETON, WISCONSIN.

REFINING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 722,060, dated March 3, 1903.

Application filed March 24, 1902. Serial No. 99,751. (No model.)

To all whom it may concern:

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

My invention relates to certain new and useful improvements in refining-engines of the "Jordan" type, and has for its object to provide a novel construction of cylinder to facilitate securing the blades in groups or series or singly thereon, to provide a novel distributon of the blades about the shell of the engine, whereby to cause the cylinder or plug of the engine to maintain a central position therein, to provide for protecting the blades against the action of acids in the pulp, and to provide the blades in the shell with integral spacing members, thereby dispensing with the separate wood fillers.

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

Figure 1 is a transverse section through a refining-engine constructed according to my invention. Fig. 2 is a part plan and part longitudinal section of a plug with the blades, filling-strips, and wedge-blocks in place. Fig. 3 is similar view of the plug with these parts removed. Fig. 4 is a perspective view showing in detail the respective blades, filling-strips, and wedge-blocks employed on the plug. Fig. 5 is a detail view of one of the blades used about the shell. Fig. 6 is a modified form of the same, and Fig. 7 is a view in cross-section of a blade provided with an acid-resistant strip.

Referring now to the drawings, 1 indicates the shell, and 2 the plug, of an ordinary Jordan engine. At each end of the plug 2, which, as usual, is in the form of a truncated cone, I provide an annular projection or ring 3 4, respectively, and connect said rings by longitudinal ribs 5, located at equal distances apart around the surface of the plug. The outer surface or periphery of the plug is indicated by 6. The rings 3 4 and the ribs 5 are preferably cast integral with the plug for the sake of economy in manufacture, but they may be made separate from the plug and secured thereon in any suitable manner, as by being bolted thereto. Said rings and ribs project a considerable distance beyond the surface of the plug, as shown, and each ring is provided on its inner side with an annular projection 7 8, respectively, inclined on its under side, as shown, and extending between the ribs 5 and forming with the periphery of the plug an annular recess 9 10, respectively, in each end ring. Each of the ribs 5 is cut away for about one-half of its length on one side from the larger toward the smaller end of the plug to provide a recess 11 for the reception of the short bars of the plug, as more fully explained hereinafter, and the part of the rib forming the end of this recess opposite the ring 3 is undercut to provide a projection 12 and a recess 13, having an inclined wall, as shown. The annular ring 3 is provided midway between each two adjacent ribs 5 with a groove 14 for the reception of one end of a wedge-block 15. Centrally of each rib 5, on the side opposite that provided with the recess 11, is located a pin 16, for a purpose to be presently described.

Each of the blades 17 secured on the plug is of the form shown in Fig. 4 and comprises a substantially rectangular metal plate of the length of the plug, having at opposite ends, respectively, tongues 18 19, tapered or inclined on their upper sides to engage in the recesses 9 10, recesses 20 21, adapted to receive the annular projections 7 8, and projecting end portions 22 23, which rest upon the outer side of the rings 3 and 4 and extend to the ends of the plug. Each blade 17 is also provided centrally of its length with an aperture 24, which is designed to receive the pin 16. I have shown the blades grouped about the plug in a manner to form compound bars 25, containing two blades 17 in each, and between each pair of blades 17 so grouped together is a filling-strip 26 of wood or metal, preferably the latter. These filling-strips are slightly thicker than the blades 17 and are about two-thirds the width of said blades. They have the same formation at the ends as described in connection with the blades 17 and are also provided with a central aperture 27 to receive the pin 16.

In Fig. 4 is shown one of the two short blades 28, which are assembled in each recess 11. Said blades are of the same dimensions as to

width and thickness as the blades 17 and have at their outer ends the same formation. At the inner end of these short blades 28 is a single projection 29, which is adapted to be inserted in the recess 13, the inner end of the bar above this projection abutting against the inner end or projection 12 of the recess 11. Two short blades 28 are assembled in each recess 11 to form a compound bar 30 and are separated by a short filling-strip 31, one of which is shown in Fig. 4. These short filling-strips are of the same width and thickness as the long strips 26 and have the same formation at the ends as the short blades 28.

In Fig. 4 I have shown one of the wedge-blocks 15, which are placed between the long compound bars 25 and the short compound bars 30 to wedge and hold said bars securely in position. This wedge-block comprises a strip of wood or metal, preferably the latter, tapering from one end to the other, and at its smaller end having a projection 32, recess 33, and projecting end portion 34 in the same manner as the blades 17. Said wedge-blocks are also tapered from their top to their bottom sides or transversely and are each provided on one side with an integral flange 35, which extends from about the center of the block to the smaller end thereof and is about one-half the width of the block. When the wedge-block is in position, the inner end of the flange 35 will abut against the inner end of the adjacent compound bar 30 and extend halfway across the width of the same, while the flange itself will overlap a corresponding portion of the rib 5 below said short compound bar 30, its projecting end portion 34 resting on the ring 4.

In assembling the blades about the cylinder a blade 17 is first bent laterally outward to shorten its length, so that the tongue 19 may be inserted in the recess 10 of one of the chambers or spaces between two ribs and the tongue 18 in the recess 9 on one side of the groove 14, when the blade is sprung sidewise against the side of the rib 5, containing the pin 16, which latter will pass through the aperture 24 in the blade. A filling-strip 26 in like manner is next placed beside this blade, the pin 16 entering the aperture 27 therein. A second blade 17 is now placed beside the filling-strip, and its outer side will lie flush with the wall of the groove 14. The pin 16 will enter the aperture 24 in this outer blade, but will not project beyond the side of the blade. In a similar manner two short blades 28 and an interposed filling-strip 31 are assembled in the recess 11, the projections 29 on the inner ends of these blades and the corresponding projection on the filling-strip 31 entering the recess 13, or, in other words, engaging under the projection 12 at the end of said recess 11. A wedge-block 15 is now inserted through the groove 14 between the compound bars 25 and 30 and driven in until its projection 32 has passed under and its recess 33 has received the annular projection 8 at the smaller end of the plug. Said wedge-block is now driven downward between the blades until it is wedged firmly in position, its larger end of course lying in the groove 14, which is tapered to correspond with said block. If preferred, screw-bolts 36, passing through suitable apertures 37 in said wedge-block and engaging in screw-threaded apertures in the plug, may be used to draw the wedge-block 15 downward between the blades and hold it securely in position. In like manner the entire surface of the plug may be provided with alternate long and short compound bars. It will be seen that any two ribs 5, with the rings 3 and 4, inclose a space, forming, as it were, a chamber, and in each one of these chambers there will be secured a long and a short compound bar. It will also be seen that as thus far described a space will be left between the short compound bar 30 and the flanged portion 35 of the wedge-block 15 of one chamber and the long compound bar 25 of the adjacent chamber. In order to fill up this space and provide a smooth surface for the stock to travel over during the operation of the engine, I provide a second wedge-block 38, (shown in Fig. 4,) which is of a shape to fill in the space between the short compound bar of one chamber and the long compound bar of the adjacent chamber and the space between the flange portion 35 of wedge-block 15 and said long compound bar. The wedge-block 38 is substantially flat on its under side and when wedged in position will rest upon one or the other of the ribs 5 and the rings 3 and 4. The wedge-block 38 may also be provided with apertures 37 and be drawn to and secured in position by means of screw-bolts 36.

I have shown the plug of the engine provided with compound bars 25 30, having two blades each. This is the arrangement that will ordinarily be employed; but according to the character of stock being ground or the particular effect upon the stock to be produced by the grinding it may be found necessary, or at least desirable, at times to employ bars having a greater or less number of blades than two. It is within the spirit of my invention to provide for this emergency, and this is accomplished as follows: If in the case of the plug shown in the drawings it be desired to use single blades only, I simply remove one of the blades of each compound bar and substitute therefor a filling-strip of the same thickness, and the blades can then be wedged in position as before. The construction described herein permits the employment of one or two blades only. It will be apparent, however, that I may originally construct the chambers about the plug of such size as to render them capable of receiving compound bars of, say, four blades each. Then by removing the requisite number of blades and substituting in their stead filling-

strips I can reduce at will the number of blades in each chamber. I can also arrange the blades about the plug so that single blades will alternate with double blades or double blades with triple blades, and so on.

A further feature of my invention relates to a novel manner of disposing the blades about the shell of the engine so that in operation the plug will be maintained in a central position in the shell. As shown in Fig. 1, this I accomplish by grouping the blades closer together in the lower half of the shell than in the upper half. A convenient way to do this is to group the blades 39 in the lower half of the shell into series of four blades each, which series are separated from each other by means of wood or metal spacing-blocks 40, and to employ series of single or double or triple blades, or all three, as shown, in the upper half. It is found in the use of the ordinary Jordan engine that owing to its great weight the plug will soon wear away its bearings and fall, so that the axis of the plug will be below the longitudinal or axial center of the shell, so that the blades on the plug work nearer to the blades in the lower half of the shell than they will to the blades in the upper half of the shell. This produces unnecessary wear and strain of the engine, and the stock will not be as uniform in quality as were the plug to be maintained in a central position in the shell, so that the grinding would be uniform throughout. By increasing the number of blades in the lower half of the shell I increase the resistance to grinding in that part, and by employing a comparatively few number of blades in the upper half I lessen the resistance to grinding in said upper part, and as the plug will have a tendency to revolve in the path of least resistance said plug will be constantly lifted, as it were, and maintained in a central position.

In Fig. 5 I have shown one of the blades 39 employed about the shell. This blade is made of a single bar of metal and is provided on one side with integral lugs 41, which when the blades are placed side by side will operate to space the blades the requisite distance apart, and thus take the place of the ordinary separate filling-strips. This construction of blade enables me to effect a great saving in the cost of "loading" the shell with blades. In Fig. 6 I have shown a modification in the construction of this blade, wherein in place of separate lugs 41 I employ a continuous integral rib or projection 42 on the side of the bar. The former construction is to be preferred, however, by reason of its greater lightness and economy.

A still further feature of my invention relates to protecting the blades on the plug against the action of the acids used in the reduction of the stock. To this end, as shown in Fig. 7, I provide each blade on its front side or the side which comes into contact with the stock as the plug revolves with an offset or recess 43, which extends from the outer edge of the blade to about the line that the outer edge of the filling-strip will occupy when the blades are assembled on the cylinder, and in this recess I solder or otherwise secure a bronze, brass, or other acid-resistant metal strip 44, the outer edge of which lies flush with the edge of the blade and the outer surface of which lies flush with the surface of the blade. In the use of unprotected blades such as are now universally employed it is found that that side of the blade which first comes in contact with the acidulated stock is soon affected by attrition and the action of the acid to such an extent that the blade becomes sharp on the edge and its usefulness is greatly impaired, if not entirely destroyed. By protecting the blade, as above described, said blade will wear square, due to the fact that its striking side will not be much affected by the acid in the stock.

By providing recesses with inclined upper walls for the reception of the correspondingly-tapered tongues of the blades and filling-strips I secure an important advantage, inasmuch as when the blades and strips after being bent and inserted in said recesses are sprung back to a straight line the engagement of said inclined surfaces will operate to force the blades and strips downward against the surface of the plug, while wedging the tongues in the recesses, thus affording a secure and rigid end fastening for the blades and interposed strips.

Having thus fully described my invention, what I claim as new is—

1. In a refining-engine, a plug provided with a series of inclosed chambers extending from end to end of the plug for the reception of the blades.

2. In a refining-engine, a plug provided with a series of inclosed chambers for the reception of the blades, said chambers having inclined undercut ends.

3. In a refining-engine, a plug provided with a series of inclosed chambers extending from end to end of the plug for the reception of the blades, said chambers having inclined undercut ends, blades located in said chambers and engaging at their ends said undercut portions of the chambers, and a wedge-block inserted between and separating two or more of the blades in each chamber.

4. In a refining-engine, a plug provided at each end with an annular undercut ring, and a series of longitudinally-disposed ribs formed as integral structures with said plug connecting said rings to form a series of chambers.

5. In a refining-engine, a plug provided at each end with an annular undercut ring, and a series of longitudinally-disposed ribs connecting said rings, each of said ribs having on one side a recess and being undercut at the end of said recess.

6. In a refining-engine, a conical plug pro-

vided at each end with an annular undercut ring, and a series of longitudinally-disposed ribs connecting said rings, the ring at the larger end of the plug being grooved between each pair of ribs.

7. In a refining-engine, a conical plug provided at each end with an annular undercut ring, a series of longitudinally-disposed ribs connecting said rings, the ring at the larger end of the plug being grooved between each pair of ribs, blades located between each pair of ribs and engaging at their ends the undercut portion of said rings, and a wedge-block inserted between each set of blades and engaging at one end the undercut portion of the ring at the smaller end of the plug and having its opposite end located in one of the grooves of the ring at the larger end of the plug.

8. In a refining-engine, a plug having an undercut annular ring at each end, a series of longitudinally-disposed ribs connecting said rings, each of said ribs having in one side a recess and being undercut at the end of said recess, a series of long blades extending from end to end of the cylinder and engaging at their ends the undercut portion of said rings, a series of short blades located between adjacent long blades in the recess in said ribs and engaging at opposite ends the undercut portions of one of said rings and said ribs, respectively, and wedge-blocks inserted between the various sets of blades.

9. In a refining-engine, in combination with the plug having blades disposed about its periphery, an outer surrounding shell provided with blades coacting with those of the plug, said shell having a greater number of blades in its lower than in its upper half.

10. In a refining-engine, in combination with the plug having blades disposed about its periphery, an outer surrounding shell provided with blades coacting with those of the plug, the blades in the lower half of said shell being arranged closer together than in the upper half thereof.

11. A blade for refining-engines having a strip of acid-resistant metal applied to one of its sides.

12. A blade for refining-engines having a strip of acid-resistant metal secured on one of its sides with its upper edge flush with the upper edge of said blade.

13. A blade for refining-engines having an offset provided in one side, and a strip of acid-resistant metal set in said offset and secured to said blade, and having its upper edge flush with the upper edge of said blade.

14. In a refining-engine, a series of blades grouped together and separated from each other by means of an integral projection on one or more of the blades.

15. In a refining-engine, a plug of the character described provided with a series of longitudinally-disposed inclosed chambers extending from end to end of the plug for the reception of the blades, said chambers having undercut ends affording chambers having inclined upper sides.

16. In a refining-engine, a plug of the character described provided with a series of longitudinally-disposed inclosed chambers extending from end to end of the plug for the reception of the blades, said chambers having undercut ends providing recesses with inclined upper sides, blades located in said chambers and having tapered end portions engaging said undercut portions of the chambers, and a wedge-block inserted between and separating two or more of the blades in each chamber.

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

SOLOMON R. WAGG.

Witnesses:

GEO. H. PEERENBOOM,

JOHN H. L. HELLER.