No. 790,938. PATENTED MAY 30, 1905.

S. R. WAGG.

STONE PLUG CONSTRUCTION FOR REFINING ENGINES.

APPLICATION FILED AUG. 6, 1903.

Fig. 1.

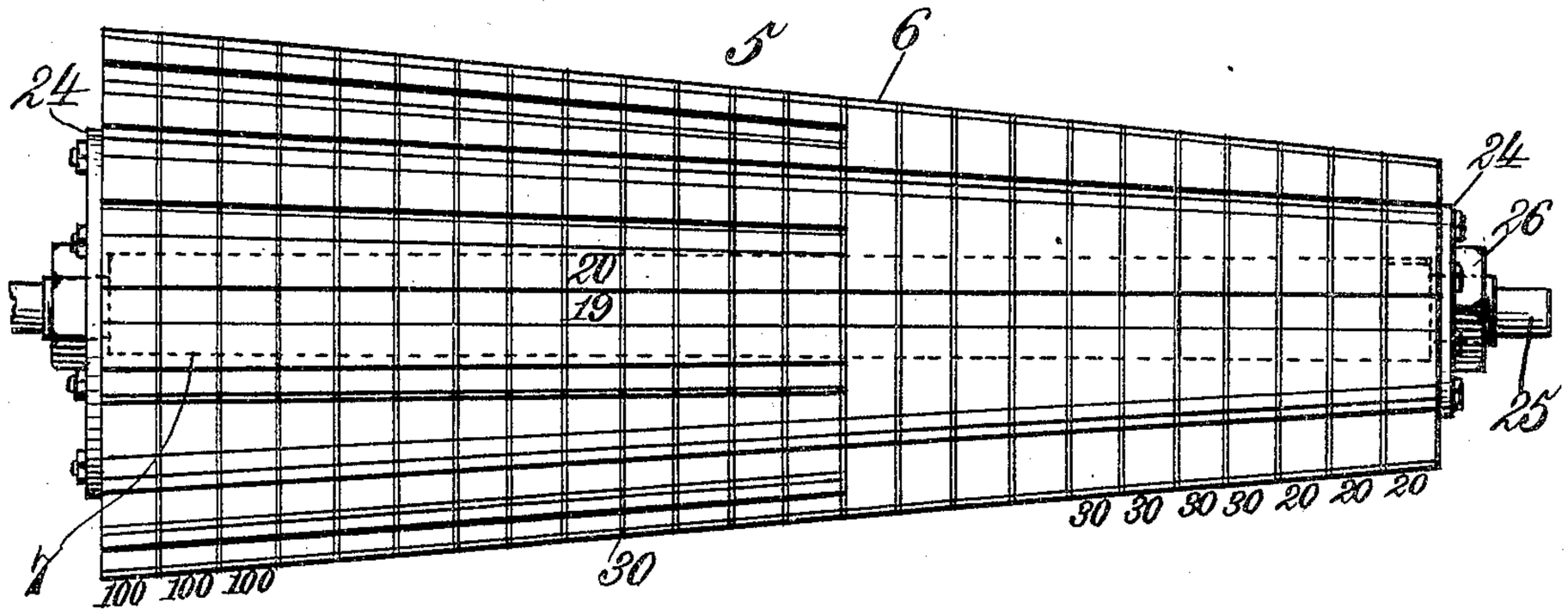


Fig. 2.

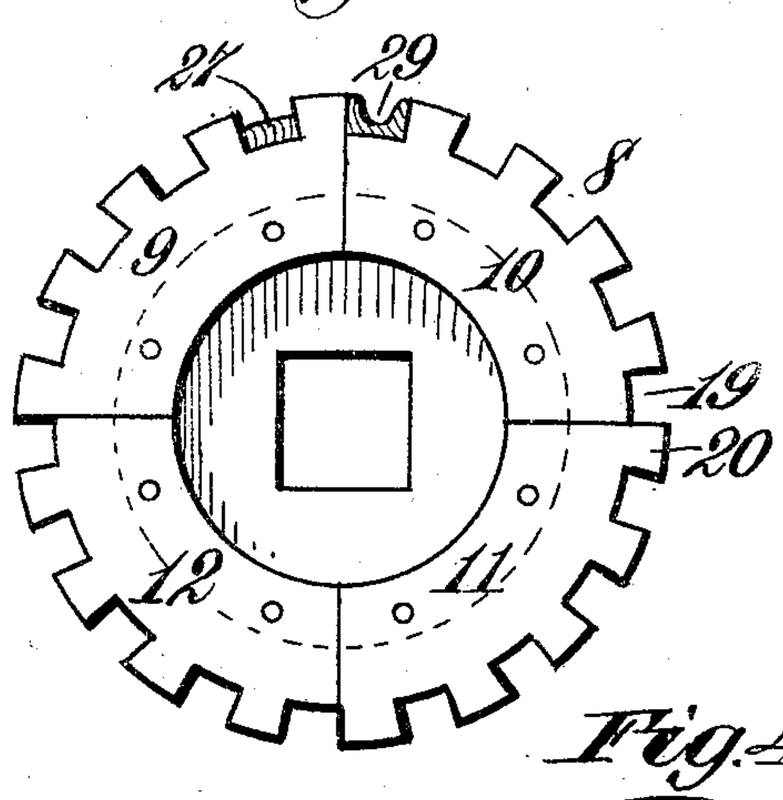


Fig. 3.

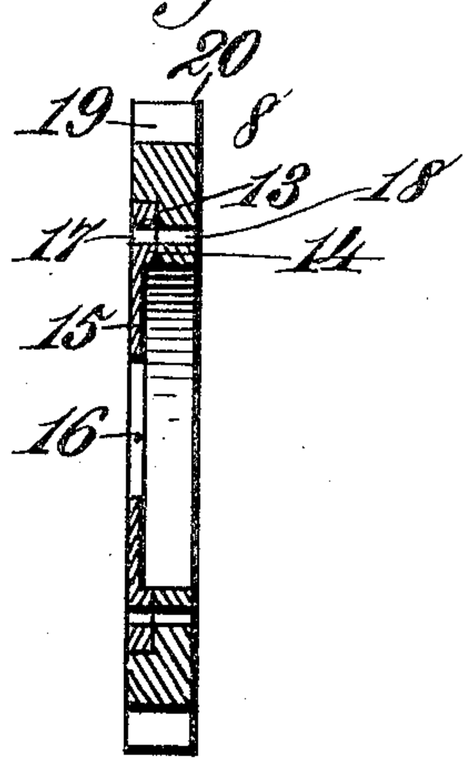
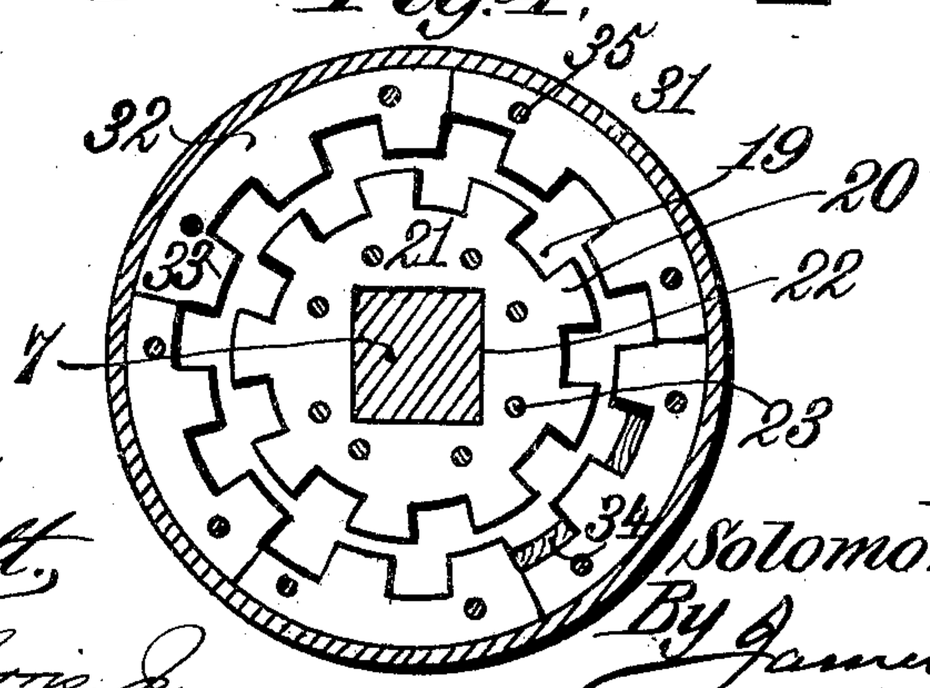


Fig. 4.



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No. 790,938. Patented May 30, 1905.

UNITED STATES PATENT OFFICE.

SOLOMON R. WAGG, OF APPLETON, WISCONSIN.

STONE-PLUG CONSTRUCTION FOR REFINING-ENGINES.

SPECIFICATION forming part of Letters Patent No. 790,938, dated May 30, 1905.

Application filed August 6, 1903. Serial No. 168,535.

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 Stone-Plug Construction for Refining-Engines, of which the following is a specification.

This invention relates to certain new and useful improvements in refining-engines, and has for its object to provide a novel construction of stone plug.

To this end the invention consists in arranging a series of stone disks side by side on or about a central shaft to form the completed plug, in the novel manner of constructing certain of the larger disks, in providing disks of different degrees of fineness of grit or grain, whereby the plug as a whole will be composed of stone disks gradually increasing in fineness from the small end of the plug to the larger end, and in providing a series of stone disks having peripheral grooves or recesses to afford integral radially-projecting teeth which when the disks are assembled on the shaft to form the plug are adapted to aline, whereby to provide a series of blades and interposed grooves extending longitudinally of the plug.

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

Figure 1 is a side elevation of the plug of a Jordan engine constructed according to my invention. Fig. 2 is a side view of one of the larger stone disks, showing the same to be composed of four segmental sections. Fig. 3 is a sectional view taken through the center of the disk of Fig. 2, and Fig. 4 is a section through the cylinder and plug, showing in elevation one of the stone disks located at the smaller end of the plug, the same being composed of an integral piece of stone, and also showing one of the stone segments of the shell.

Referring now to the drawings, 5 indicates the plug of a Jordan engine, which is composed of a series of stone disks 6 set side by side on a central squared shaft 7. The disks 6 at the larger end of the plug are of such size, approximating three feet in diameter, as to render it impracticable to construct them from a single piece of stone. I therefore adopted the construction for the larger disks, as illustrated in Figs. 2 and 3, in which the disk indicated generally by 8 represents the largest disk of the plug. This disk I construct of four segmental sections 9, 10, 11, and 12, which are rabbeted on one side around their inner circumference, as indicated at 13, to receive an enlarged annular rib 14 of a circular metal plate 15, which is provided with a central squared opening 16, adapted to fit snugly upon the shaft 7. The circular metal plate 15 is provided at suitable intervals with apertures 17, which are adapted to aline with corresponding apertures 18 made in the segments of the disk, the purpose of which will presently appear. Each of the segments 9, 10, 11, and 12 of the disk 8 is provided at the periphery with recesses 19 and projections or teeth 20.

Referring to Fig. 4, the disk 21 there illustrated may be assumed to be the disk at the smaller end of the plug and differs in construction from the disk 8 in the fact that it is made as an integral structure from stone. It is provided with a squared opening 22 to receive the shaft 7, with recesses 19 and projections or teeth 20, and with apertures 18 in the same manner as the disk 8.

It will be understood that solid stone disks 21, gradually increasing in size, are employed until the size of the disk renders it impracticable to construct them from a single piece of stone, when the disks 8 are then employed, composed of sections of stone, as illustrated in Fig. 2. The apertures 17 in the circular plates 15 and the apertures 18 in the stone disks or stone segments alining therewith are for the purpose of permitting metal bolts to be passed through all of the stone disks, these bolts being indicated by 23. At opposite ends of the plug the bolts 23 pass through circular metal clamping-plates 24, located at each end of the plug, and have applied thereto nuts for clamping the plates 24 firmly against the outer sides of the end disks. The opposite ends of the squared shaft 9 are provided with round extensions 25 to provide the journals for the

plug, and preferably these journals are screw-threaded adjacent to the clamping-plates 24, whereby clamping-nuts 26 may be applied and screwed up tightly against the clamping-plates 24 to more firmly compress the disks 6 together.

When assembled in the manner shown in Fig. 1, the projections or teeth 20 of the various disks 6 are brought into alinement, whereby to provide a series of longitudinal stone bars with interposed grooves for the passage through the machine of the stock. In order to brace these stone bars and to assist in preventing them as far as possible from crumbling at the edges, I insert in each longitudinal groove a filler-strip of wood. As shown at 27 in Fig. 2, this filler-strip may be flat and only partially fill the grooves, or, as shown at 18, they may extend flush with the outer edges of the teeth 20 and have their central portions cut out, as indicated at 29, to provide the requisite grooves for the passage of the stock.

As previously stated, an important feature of the invention resides in having the stone disks at the inlet or smaller end of the plug relatively coarse in grain and to employ disks of successively less degrees of coarseness as the outlet or large end of the plug is reached, where disks of the finest grain or grit will be employed. The disks which I employ are preferably made of artificial stone, such as carborundum, and the different grades of this stone are designated by numbers. Assuming No. 20 to be the coarsest grade which I will employ, I would preferably locate three disks 6 at the smaller end of the plug of this grade of stone. I would then employ a suitable number of disks—say three or four of the next finer grade—say No. 30—and continue using disks of a successively less degree of coarseness until the larger end of the plug is reached, where three or more disks of a grade—say No. 100—would be arranged, such disks having a very fine grain or grit.

The stock treated in a plug constructed as described will first be subjected to the action of the coarse stone located at the inlet end of the engine and then be subjected to the action of stones of successively less degrees of coarseness until before leaving the engine the stock would be treated to the action of stones of a very fine grain, which will impart an extremely fine finish to the stock, resulting in the production of a paper of great smoothness. The employment of stone bars or blades instead of metal results in the treatment of the stock to a disintegrating rather than cutting action, and thus the resultant paper is very much stronger in texture and less brittle than paper that has been subjected in the refining-engine to the action of metal knives.

In order to secure a close union between the various disks, I preferably interpose a circular disk 30, of canvas, between each two disks. This canvas will fill up any interstices that may exist between the disks, so that the plug will practically present the appearance of an integral structure. Canvas, moreover, being yielding will enable the stone disks to be more firmly clamped together without danger of breaking or crumbling than if the stone were brought directly face to face, as will be understood.

An important advantage of this construction of stone plug resides in the ease and economy with which new disks may be supplied to take the place of those which have been worn out.

In the ordinary Jordan engine the plug has an endwise adjustment of about twelve inches to take up for the wear of the blades of the plug. In the use of plugs constructed according to this invention, when the limit of this adjustment has been reached the first one or two disks at the smaller end of the plug may be removed. The other disks may be pushed forward toward the clamping-plate 24 at the smaller end of the plug, and one or more large disks 8 may be inserted on the shaft 7 at the large end of the plug, the number of new disks placed on the plug of course corresponding to the number of small disks that have been removed. Thus it will be seen that I provide for an extended use of all of the disks, except the first two disks initially employed at the smaller end of the plug. It will of course be understood that as the large disks 8 are made to approach the smaller end of the plug the teeth or projections 20 will be more and more worn away, and consequently the recesses 19 will have to be deepened.

Instead of the disks 30 being of canvas they may be of wood or of any other material softer than stone.

Referring now to Fig. 4, 31 indicates the cylinder of the engine, which is lined around its interior with a series of segmental blocks 32 of stone, having integral bars or blades 33 in the grooves, between which are inserted wooden filler-strips 34. A Jordan engine is about five feet long, and it is impracticable to make the blocks 32 of such length. They are therefore made in sections of any desired length and placed end to end and secured together by means of bolts 35, extending longitudinally through all of the sections composing a block in suitable alining apertures provided in the sections for the purpose. One advantage which may be mentioned for this construction of cylinder is that it provides a series of fixed blades or bars which cannot be tilted over, which may happen where independent blades are employed unless the latter are firmly braced in position.

It will be understood by those skilled in the art that the improvements herein may be em-

ployed in connection with an ordinary beating or Holland engine and likewise that changes may be made in the form, arrangement, and construction of parts herein described without departing from the spirit of my invention.

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

1. A plug for refining-engines comprising a central shaft, and a series of separate disks arranged side by side on said shaft and provided with alternate teeth and recesses.

2. A plug for refining-engines composed of a series of stone disks, substantially as described.

3. A plug for refining-engines composed of a series of stone disks, each of which is provided on its periphery with alternate teeth projections and recesses.

4. A plug for refining-engines composed of a series of stone disks of successively less degree of coarseness from the smaller to the larger end of the plug.

5. A plug for refining-engines comprising a shaft, a series of stone disks mounted side by side on said shaft, and means for clamping said disks firmly together.

6. A plug for refining-engines comprising a shaft, a series of stone disks mounted on said shaft and providing a series of longitudinal grooves extending longitudinally of the plug, and means for clamping said disks together.

7. A plug for refining-engines comprising a shaft, a series of stone disks mounted side by side on said shaft, and provided with a number of alining apertures, clamping-plates mounted on opposite ends of said shaft and bolts passed through said clamping-plates and through the apertures in said disks, and provided with nuts whereby the disks may be firmly clamped together.

8. A plug for refining-engines comprising a shaft, a series of stone disks mounted on said shaft provided with a series of alining apertures, clamping-plates mounted on each end of said shaft, bolts passed through said clamping-plates and through the apertures in said disks and provided with nuts, a projection at each end of said shaft provided with screw-threads, and a nut screwed on each of said projections and bearing against said clamping-plates.

9. A plug for refining-engines comprising a central shaft and a series of stone disks mounted on said shaft, said disks being of successively-decreasing diameter from one end to the other of the shaft whereby when assembled upon the shaft to present a conical structure, and means for clamping said disks together.

10. A plug for refining-engines comprising a central shaft, a series of stone disks mounted on said shaft, a yielding substance interposed between each of said disks, and means for clamping said disks and the interposed material firmly together.

11. A plug for refining-engines comprising a central shaft, a series of stone disks mounted thereon, a disk of canvas inserted between each two stone disks, and means for clamping said stone disks and interposed canvas disks together.

12. A disk for the plug of a refining-engine comprising a central metal disk provided with an aperture and a series of stone segments arranged about said metal disk, substantially as described.

13. A disk for the plug of a refining-engine comprising a circular metal disk having an aperture and provided with an annular rib projecting from one side at its outer edge, and a series of stone segments arranged around said circular disk and provided with rabbeted portions to receive said annular rib.

14. A plug for refining-engines composed of a central shaft, and a series of disks fixedly arranged side by side on said shaft and providing a series of longitudinal grooves extending longitudinally of the plug.

15. A stone plug for refining-engines affording a series of bars with interposed grooves, and a wooden filler-strip inserted in each groove and supporting the edges of said bars.

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

SOLOMON R. WAGG.

Witnesses:
GEO. H. PEERENBOOM,
P. L. SCHUELLER.