June 21, 1927. 1,633,308

A. LE R. BOLTON

SPIRAL BAR

Filed March 15, 1923 2 Sheets-Sheet 1

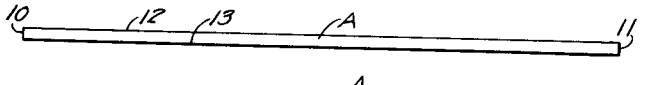


FIG. 1

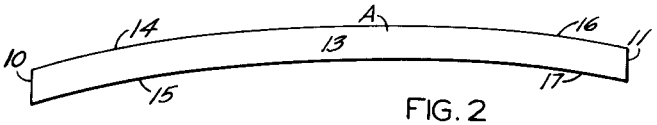


FIG. 2

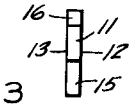


FIG. 3

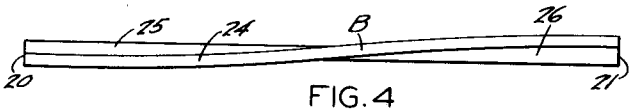


FIG. 4

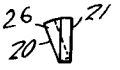


FIG. 6



FIG. 7

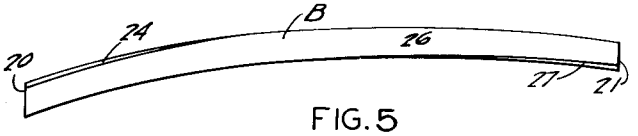


FIG. 5

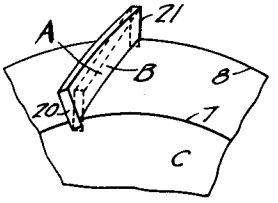


FIG. 8

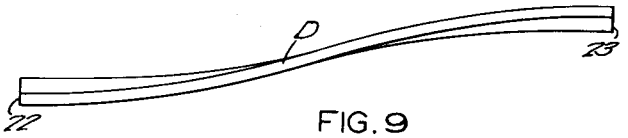


FIG. 9

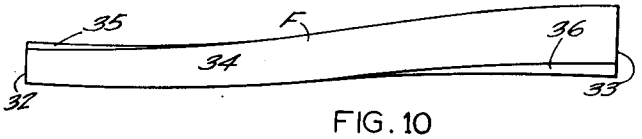


FIG. 10

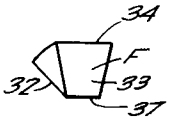


FIG. 11

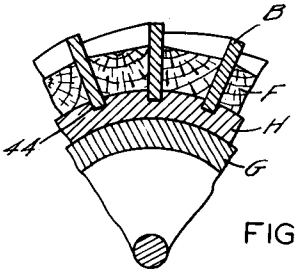


FIG. 12

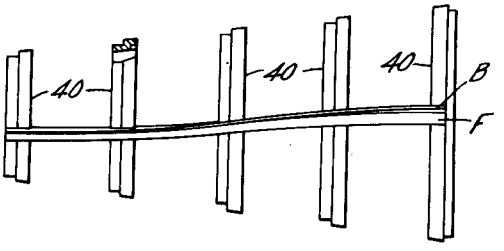


FIG. 13

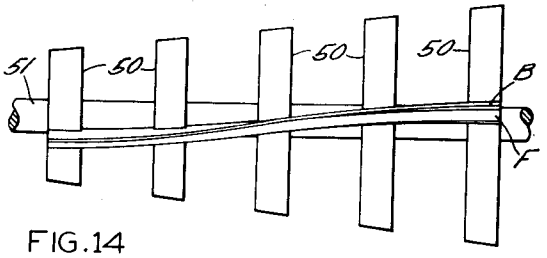


FIG. 14

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Archer Le Roy Bolton
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Gardner W. Pearson
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June 21, 1927. 1,633,308

A. LE R. BOLTON

SPIRAL BAR

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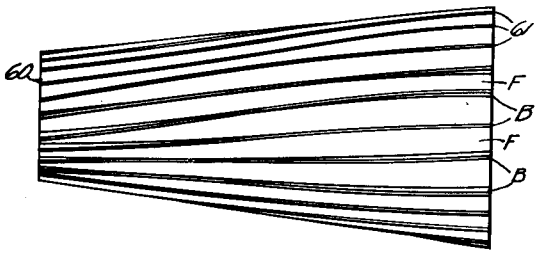


FIG. 15

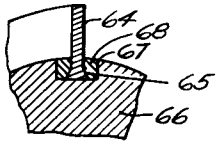


FIG. 16

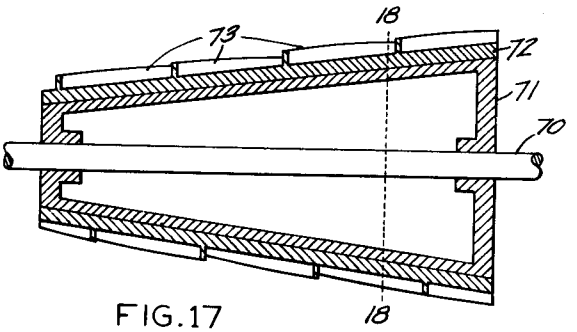


FIG. 17

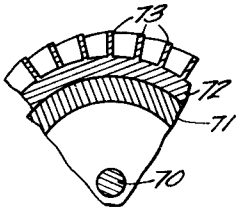


FIG. 18

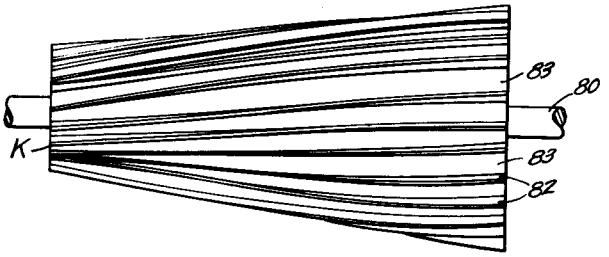


FIG. 19

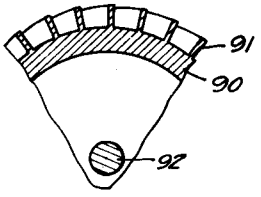


FIG. 20

Archer LeRoy Bolton INVENTOR.

BY

Gardner W. Pearson ATTORNEYS.

Patented June 21, 1927. 1,633,308

UNITED STATES PATENT OFFICE.

ARCHER LE ROY BOLTON, OF NORTH ANDOVER, MASSACHUSETTS.

SPIRAL BAR.

Application filed March 15, 1923. Serial No. 625,268.

This invention relates to the plugs of Jordan engines.

I am well aware that numerous types of plugs have been proposed and used. Some are cast in one piece, others cast in several pieces, and others are built up. I am also aware that it has been suggested that the bars of such plugs could be arranged diagonally or at a slight slant with the axis of the plug.

I claim to be the first, however, to provide bars, whether detachable or integral, arranged in a spiral or curve on such a plug.

The advantage of a spiral bar is that it helps to accelerate the passage of the stock, while its side faces can be at all points parallel with a radial line from the center of the plug thus avoiding retarding pockets such as must occur with a straight bar diagonally positioned.

By changing the curve, the rate of movement of the stock from one end to the other can be regulated and if desired, the pitch or angle of the sides with reference to radial lines can be altered thus increasing or decreasing the rolling action of the stock between the bars.

In the drawings, Figure 1 is a plan view of a straight bar which may be set diagonally in a plug.

Fig. 2 is a side elevation of such a straight bar cut away at the top and bottom to fit a groove of uniform depth in the plug and to project a uniform distance from the surface thereof.

Fig. 3 is an end elevation of Fig. 2.

Fig. 4 is a plan view of a spiral bar, the spiral being exaggerated to show the difference between a straight and a spiral bar.

Fig. 5 is a side elevation of Fig. 4.

Figs. 6 and 7 are end views of Fig. 4 from different positions to show that there is no position in which it is possible to sight from one end to the other without seeing the spiral curve on one side or the other.

Fig. 8 is a diagram showing the difference in the position of the top edge of a spiral bar from a straight bar diagonally positioned.

Fig. 9 is a plan view of a spiral bar in which the spiral is not uniform.

Fig. 10 is a plan view of a wood suitable for use with the bar shown in Fig. 4.

Fig. 11 is an end view of Fig. 10.

Fig. 12 is a sectional view of a plug having a removable jacket with a continuous body on which are built spiral bars and woods.

Fig. 13 is a side elevation of a plug jacket of skeleton construction with one spiral bar and one spiral wood in position.

Fig. 14 is a side elevation similar to Fig. 13 of a skeleton plug with one bar and one wood in position.

Fig. 15 is a side elevation of a plug with a continuous surface in which are spiral grooves, in several of which are spiral bars separated by spiral woods.

Fig. 16 is a section showing how a spiral bar made, for instance, of steel can be imbedded in other metal forming a plug, such metal having been cast about the base of the bar.

Fig. 17 is a vertical longitudinal section of a plug with a continuous body and a removable continuous jacket forming part of which are cast bars.

Fig. 18 is a section of Fig. 17 on the line 18—18.

Fig. 19 is a side elevation of a plug which has spiral bars and which may have a continuous or skeleton faced plug body, a continuous or skeleton removable plug jacket body and in which the bars may be cast integrally, fixed in slots with woods between or otherwise formed.

Fig. 20 is a sectional fragment showing a plug with a continuous body integral with which the bars are cast.

In the drawings, in Figs. 1, 2 and 3 at A, I show a straight bar which has been fitted into a straight slot arranged at a slight angle or diagonally on the conical plug. This slot was of uniform depth and the outer face of the bar was formed to project an equal distance at all points from the surface.

In Figs. 4, 5, 6 and 7, I show a curved or spiral bar such as I propose to use and of which I claim to be the inventor.

It is observed that the sides 12 and 13 of bar A lie in parallel straight planes, and that the inside face 15, 17 and outside face 14, 16 are parallel, the curves at 14, 15 near the end 10 being more than they are at 16, 17 near the end 11 on account of the conical shape of the plug.

With the bar shown in Figs. 4, 5, 6 and 7, however, while the side faces 25 and 26 are parallel throughout their length, they are not in a flat plane, but as shown in Figs. 6 and 7 in looking from one end such as 21 the other end cannot be alined.

Observing Fig. 5, it will be seen that while the top face 24 and the bottom face 27 may be parallel, they are also in what might be called twisted planes.

In Fig. 8, I show in full lines a bar such as B of spiral form located on the cone C running from the small end 7 to the large end 8. It will be observed that the end 21 lies in a radial direction to the center of the plug as does also the end 20. With a straight bar such as A, however, as shown at 10, one end would be parallel to the other, but if arranged diagonally as indicated, it would not lie in a radial direction.

As it is highly desirable that there should be no pockets near one end of the plug rather than the other in which the stock might be caught, it will be seen by examining Fig. 8 wherein the advantage of my spiral construction lies.

In Fig. 9 at D, I show a spiral bar which, from ends 22 to end 23, does not follow a uniform curve but an increasing or decreasing curve. It will be obvious that by changing the curve from one end to the other I can change the forcing action of the bars, accelerating or retarding the rapidity of the passage of the stock.

In Fig. 10 at F, I show a suitable wood or wooden wedge for use between spiral bars of my design. It will be observed that the side faces 35 and 36 are in twisted planes, and that from the small end 32 to the large end 33 the woods are of a twisted wedge shape, the top faces 34 also being wider than the bottom faces 37, as see Fig. 11.

I may use my spiral bars in the various combinations used in connection with plugs, as, for instance, in Fig. 12 I show a plug G having a removable jacket H formed as a continuous body in suitable grooves 44 in which are set spiral bars B separated by woods F. This whole jacket H can be removed at pleasure.

In Fig. 13, I show a removable plug jacket of skeleton form built up of rings 40, 40, 40, 40 in a manner similar to what is shown in application for patent by me filed Feb. 8, 1923, Serial No. 617,811, pending herewith, only a single bar B and wood F being shown to indicate the construction. When such a built-up jacket is built up, however, it can be shipped as an unit, put in place and removed.

Fig. 14 is a side elevation of what is known as a skeleton plug made up of spiders 50, 50, 50 fixed to a shaft 51. This may have suitable slots, or the bars, such as B, may be fixed thereto in any well known manner, the woods F being suitably attached.

In Fig. 15, I show a plug 60 having a continuous face in which are spiral grooves 61 in which are fixed the bars B, B. The woods F, F are forced in between them in the manner well known where straight bars are used.

In Fig. 16, I show how a spiral bar 64, which may be of high grade steel and has flanges 65 at the bottom, may be set in a groove, such as 67, in the jacket or plug 66, such groove 67 then being filled with Babbitt metal 68.

In Fig. 17, I show a plug 71 with a continuous surface carried by shaft 70 on to which is attached a continuous jacket 72 having the integral spiral bars 73.

Fig. 18 is a section on line 18—18 of Fig. 17 and shows the construction thereof.

Fig. 20 is a sectional view showing a plug 90 carried by shaft 92, such plug being formed of a continuous cast metal body with spiral ribs or bars 91 cast integral therewith and projecting outwardly therefrom.

In Fig. 19, I show a shaft 80 carrying at K what may be any type of plug or any type of jacket. 82, 82 may be any of my various types of spiral bars, and 83, 83 may be woods or the metal between the bars.

I claim to be first to use spiral bars as distinguished from diagonal bars in connection with the plug of a Jordan engine.

I claim:

1. The combination in a frusto-conical plug for Jordan engines of a permanent body, with a jacket detachable therefrom built up of a skeleton jacket body, spiral bars fastened thereto and spiral woods between said bars.

2. The combination in a frusto-conical plug for Jordan engines of a permanent body, with a jacket detachable therefrom built up of a jacket body, spiral bars fastened thereto and spiral woods between said bars.

3. The combination in a frusto-conical plug for Jordan engines of a body with spiral bars fastened thereto and spiral woods between said bars.

4. A covering for frusto-conical Jordan engine plugs including a body with spiral bars projecting from the conical surface thereof.

5. A frusto-conical Jordan engine plug having spiral bars projecting from the conical surface thereof.

6. A spiral bar for frusto-conical Jordan engines.

7. A bodily removable frusto-conical jacket for a Jordan engine plug having bars projecting from its outer surface, each forming part of an helical volute curve and each of substantially rectangular cross section.

8. A frusto-conical Jordan engine plug having bars each of substantially rectangular cross section projecting from the outer surface thereof each bar forming part of an helical volute curve.

9. A bar for Jordan engine plugs of substantially rectangular cross section and formed as part of an helical volute curve.

ARCHER LE ROY BOLTON.