Oct. 27, 1931. A. LE R. BOLTON 1,829,630

PAPER MAKING ROLL AND PROCESS OF COVERING IT

Filed March 31, 1927 2 Sheets-Sheet 1

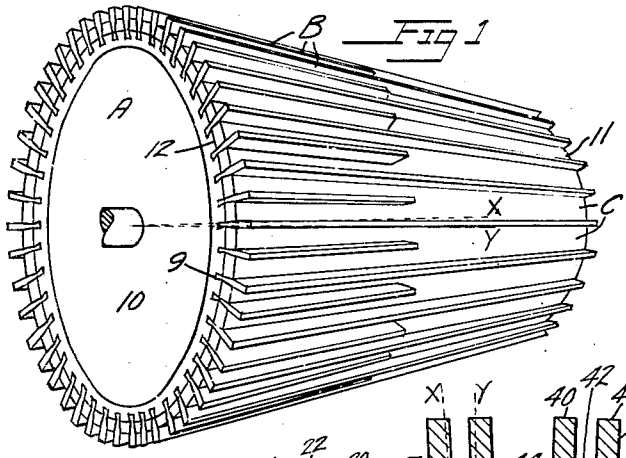


Fig 1

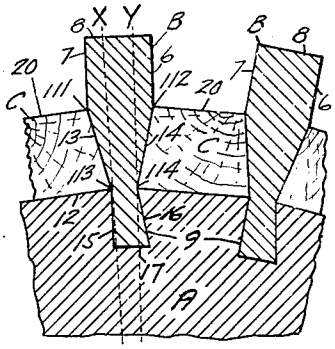


Fig 2

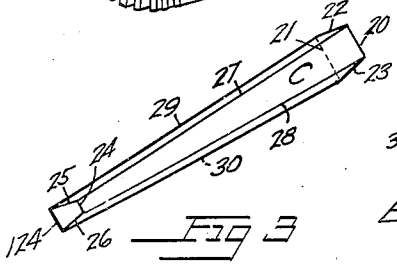


Fig 3

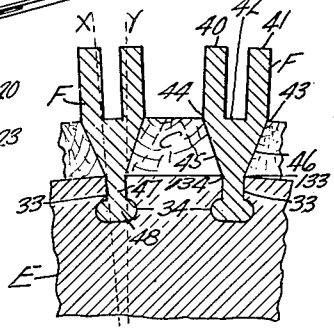


Fig 4

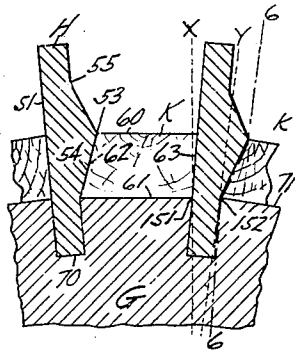


Fig 5

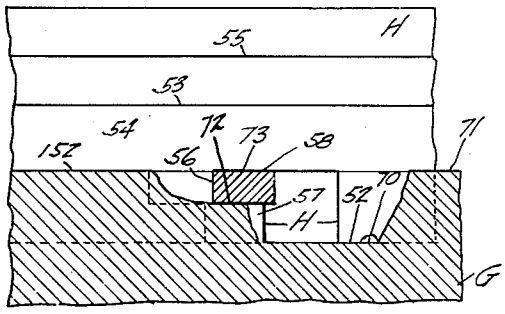


Fig 6

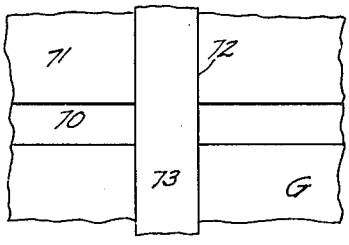


Fig 7

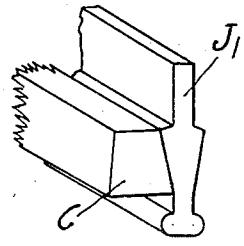


Fig 8

INVENTOR.
Archer LeRoy Bolton
BY
Gardner D. Rasson
ATTORNEY

Oct. 27, 1931. A. LE R. BOLTON 1,829,630

PAPER MAKING ROLL AND PROCESS OF COVERING IT

Filed March 31, 1927 2 Sheets-Sheet 2

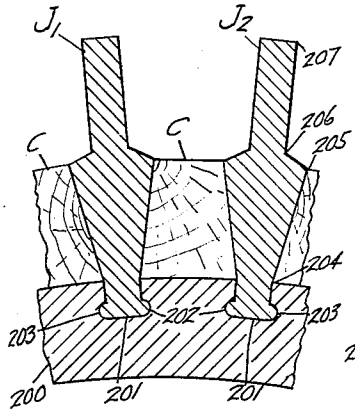


Fig 9

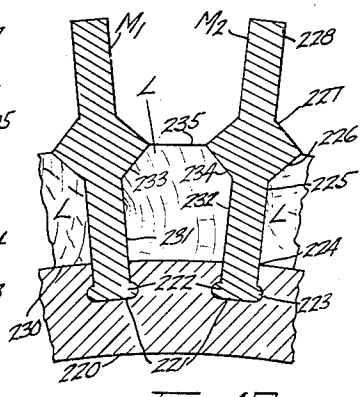


Fig 10

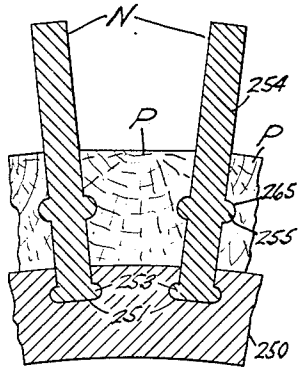


Fig 11

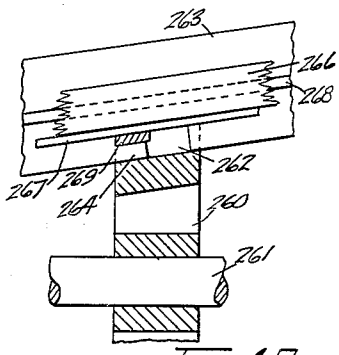


Fig 12

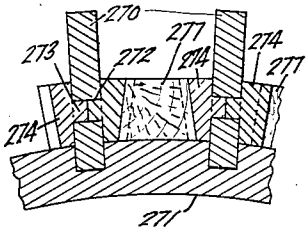


Fig 13

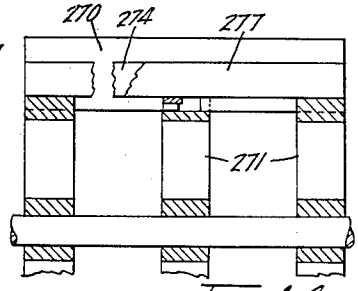


Fig 14

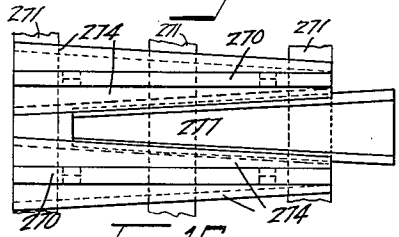


Fig 15

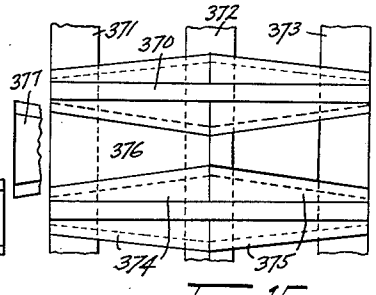


Fig 16

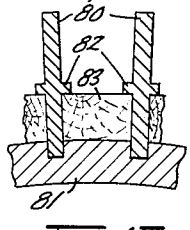


Fig 17

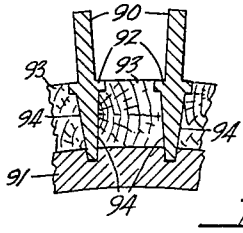


Fig 18

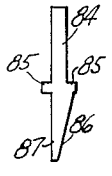


Fig 19

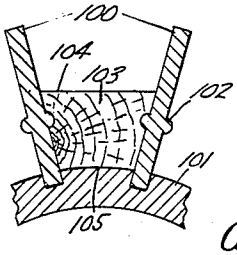


Fig 20

INVENTOR.
Archer LeRoy Bolton
BY
Gardner W. Pierson
ATTORNEY

Patented Oct. 27, 1931 1,829,630

UNITED STATES PATENT OFFICE

ARCHER LE ROY BOLTON, OF NORTH ANDOVER, MASSACHUSETTS, ASSIGNOR TO JOHN W. BOLTON AND SONS, INC., OF LAWRENCE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

PAPER MAKING ROLL AND PROCESS OF COVERING IT

Application filed March 31, 1927. Serial No. 179,981.

This invention relates to the construction of rolls for paper making engines and especially of the plugs of Jordan engines such as are used for refining paper stock.

In these engines, there is a frustro-conical shell from the inside of which project knives usually set in angular relation to each other, and inside this shell revolves a frustro-conical plug, from the curved surface of which project bars which cooperate with the knives in the treatment of the stock.

Such plugs often consist of a plurality of spiders fixed to a shaft, or a continuous surface body fixed to a shaft, each spider or said body supporting annular flanges in which are sunk metal bands. In each flange, bar grooves are cut longitudinally of the plug. Each bar has a bottom with a plurality of holding tongues, each of which is pushed under a band whereby such bar is held in place, and from being thrown, or from working outward. These are known as banded plugs.

Between these bars are wooden separators known as woods of wedge shape longitudinally, and wider at the top surface than at the bottom surface. These are driven down between the bars and are held in place by friction, and by the fact that they swell after coming in contact with the wet stock.

The purpose of this invention is to provide a plug with bars most of which are thicker at some plane outside the plane passing through the lines of contact with the plug surface than at the surface plane, whereby separators which are narrower at the top surface than at the bottom surface, can be used.

By this arrangement, the separators cannot come out but on the other hand they must be driven in from the end of the plug instead of being driven down from the top.

I may use various methods of attaching the bars to the plug body, and I prefer that the plug body should be formed at the surface of one continuous piece of metal, with grooves therein.

I use a type of bar which can be fastened at its bottom edge along the conical surface of a Jordan plug, and which extends out from the plug surface and diverges or has a part which projects whereby the woods which are narrower at the top or at some intermediate plane than at the bottom, and of general wedge shape as viewed from the top, can be driven in from the ends and will be positively kept from rising or coming out by the said projection, or the divergence of one or both sides of the adjoining bars.

The separators have no recesses for the bands, and in fact must have the side and bottom faces plane and straight in order to be driven in.

I also claim the new process of assembling the bars and separators of a Jordan engine plug and of a beater roll.

The general principle of my device and process is to make the bars of such size and shape that the separators driven in from the end between them will be wider or thicker at the bottom than at the top or at some intermediate plane whereby they will be prevented from coming out radially.

I believe I am the first to discover the principle of utilizing the converging guideways formed by the adjoining bars of a Jordan plug and the surface of the plug for receiving from the large end, separators preferably of wood of substantially wedge shape driven in from the large end.

In carrying out this idea it has appeared to be necessary, to prevent these separators from kicking up or down, to provide either diverging sides on the bars or alined means of some other type or both and preferably to have a smooth surface at the bottom.

I believe I am also the first to realize that this principle can be applied to a beater roll. I show herewith the application particularly to a Jordan, but also to a beater.

For practical purposes this is accomplished if the thickness of each bar at some point, line or plane outside the surface of the plug is enough greater than its thickness at that surface so that its sides diverge more than the divergence of radial planes extending respectively through the contact lines of the bar with the surface of the plug and through the plug axis.

To put it in another way, if some parts of one or both of the adjoining sides of adjoining

bars extend toward each other sufficiently to lock the interposed separator in place, the purpose is accomplished.

To put it in still another way, considering one bar and one separator as a unit my invention is embodied where the bottom edge of the bar has means by which it can be attached to the plug body while the thickness of the bottom surface of the separator is such, and an adjoining bar at the same plane is such, that the combined thickness less the thickness of the bar is less than the combined thickness less the thickness of the bar at a parallel plane nearer the top surface of the separator.

My preferred form of separator is of keystone cross-section with the smaller face at the top as this tends all the time to be forced inward towards the center of the plug or roll, particularly as it swells after being wet. This keeps it firmly in place and keeps the bars absolutely tight.

In the drawings, Fig. 1 is a perspective view of a plug equipped in accordance with my invention.

Fig. 2 is a section of part of the large end of Fig. 1.

Fig. 3 is a perspective of one of my wooden separators alone.

Fig. 4 is a view similar to Fig. 2, showing a modified construction.

Fig. 5 is a view similar to Fig. 4, of another modification.

Fig. 6 is a view from the right, on line 6—6 of Fig. 5, but with the wooden separator removed.

Fig. 7 is a plan view of a plug body such as shown in Figs. 5 and 6, without either bars or wooden separators.

Fig. 8 is a sectional detail of my preferred form of combination bar and separator.

Figs. 9, 10 and 11 are sectional views of modifications of my bars and separators.

Fig. 12 is a longitudinal section showing my idea applied to a skeleton or spider type of Jordan plug.

Fig. 13 is a transverse section and Fig. 14 a sectional view of my device applied to a beater roll.

Fig. 15 is a plan view showing one application to a sectional beater roll, the parts being exaggerated to better show the construction.

Fig. 16 is another plan or isometric view of diagrammatic form with the parts exaggerated showing a beater roll of spider construction with two bars in place together with the metal fillers, and on one side a bottom supporting plate.

Figs. 17, 18, 19 and 20 are details showing other applications of my idea.

In the drawings, A shows a Jordan plug of the usual frustro-conical type, having the large end 10, and the small end 11.

Extending longitudinally of the curved surface are the bars B and wooden separators C, C.

12 represents the surface of the plug which is of continuously frustro-conical form, except where the slots 9 extend longitudinally.

As shown in Figs. 1 and 2, these slots have a face 15 in a plane which would pass near the axis of the plug, and another face 16 which widens out from the surface 12, to the bottom 17.

Each bar B is of substantially the same thickness on its face 8 and down along parallel sides 7 and 6, to lines 111 and 112 which will be along the top surfaces 20, 20, of the separators C, C.

From these lines, the faces at 13 and 14 converge to lines 113 and 114 which are the lines of contact with the surface of the plug where they are just the thickness of the width of the mouth of a slot 9.

Below this point each bar B is made to fit its entire length in slot 9.

This fit may, however, be a loose running fit so that each bar can be readily introduced endwise.

It is obvious that each bar B can be driven or slid into a slot 9, and will project from the surface 12 of the plug with its faces 13 and 14 diverging.

These faces diverge more than the divergence of planes indicated by lines X and Y which pass through the axis of the plug and through the lines 113 and 114.

This construction makes it necessary to drive in the separators C, C from the large ends between adjoining bars and the plug body below the faces 7, 7.

Each separator C, as shown in Fig. 3, is of wedge shape longitudinally, the end edges 20 and 21 being longer than 24 and 124 and at corresponding points the bottom is wider between edges 29 and 30 than between 27 and 28. In cross section it is of keystone shape, the side edges 22 and 23 and 25 and 26 converging. There are no recesses in the separators to embrace bands as in most plugs now made.

In Fig. 4, E represents the body of the plug in which are longitudinal slots 33, from the bottom of which extend outwardly two grooves 34, 34.

Each bar F comprises parallel top faces 40 and 41 between which is a recess 42 which extends down substantially to a line which will be parallel to the top surface of the adjoining separator C, the top of which will come up to the lines 43 and 44 between the parallel sides and the diverging sides 45 and 46. These sides 45 and 46 converge to lines 133, 134 which coincide with the mouth of slot 33, and from said lines extend downward at 47 so as to fit slot 33, and are enlarged at 48 to fit into the grooves 34.

The separators C, C, may be of the same description as shown in Figs. 2 and 3.

In Figs. 5, 6 and 7, a plug body G has the continuous surface 71 except for the longitudinal bar slots 70, and at intervals the annular slots 72 in which are sunk bands 73 which do not extend to the bottom of the slots 70.

Each bar H, along the bottom edge 52, has parallel sides and is cut away at 58 as shown in Fig. 6, so that part 57 forms a tongue, and together with edges 56 and 58 fit around three sides of a band 73.

By pushing each bar H down into a slot, with the tongue 57 in position shown in the dotted lines in Fig. 6, and then pushing it to the right, the bar is locked in place by the various tongues and bands, in a manner well known with skeleton plugs.

From the lines 151 and 152 each bar H projects from the plug, and while one face 51 is flat and straight the other at 54 diverges to line 53 and then converges to 55, the top faces being parallel from that line outward.

Each separator K has a top surface 60, bottom surface 61 and sides 62 and 63, forming in cross section a trapezoid the top and bottom surfaces being parallel, and the sides extending at different angles.

Preferably these taper longitudinally in wedge form so that they may be more conveniently driven in, and so that they may correspond with the contour of the plug.

In all cases one or both sides of each bar diverge or form a projection from the surface of the plug body more than the radial planes X and Y so that each separator is positively held in place when once driven in from the end.

In Fig. 9, J—1 and J—2 represent adjoining bars between which are woods C, C, each of reversed keystone cross-section shape and of wedge shape as viewed from the top.

200 represents the plug body in which are longitudinal slots 201 having on each side grooves 202 into which beads 203 at the bottom of each bar fit.

From the lines 204 at the surface of the body to other lines 205, each bar diverges and then contracts to 206, and thence the sides are parallel to the outer edges 207.

In Fig. 10, the body is represented by 220 and has the longitudinal slots 221, on each side of which are the longitudinal grooves 222 into which fit the beads 223 at the bottom edge of each bar M—1 or M—2 from the lines 224 at the surface of the plug outward to the lines 225 the sides of each bar are parallel and then diverge at 226, thence converge at 227 and are parallel out to the lines 228.

The separators L at their bottom surfaces 230, so as to fit the plug body, are of wedge shape while their sides 231 and 232 diverge slightly but converge at 233 and 234, and each top face 235 is substantially narrow.

By this construction the bulging parts of the bars hold separators firmly in place.

In Fig. 11, 250 represents the plug body in which are slots 251 similar to 201 and 221 into which the beaded lower ends 253 of each bar N fits.

In this case the sides 254 of each bar are similar throughout but on each side are the beads 255 which fit into corresponding grooves 265 in the separators P, which otherwise are of inverted keystone cross section and of wedge shape lengthwise.

In Fig. 12 I show a plug body made up of spiders 260 carried by a shaft 261, such spiders having bar grooves 262 for the bars 263, having tongues 264 of the usual type.

Besides the wedge shaped separators 266 driven in at the end I provide fillers 267 to assist the separators to slide in from the ends.

269 represents a band of the usual type carried by the rim of spider 260 under which tongues 264 are forced. This is a well known construction either for Jordan plugs or beater rolls.

As shown in Fig. 12, bar 263 has a rib 268 extending longitudinally and this fits a corresponding groove in separator 266 in a manner similar to what is shown in Fig. 11.

By using fillers 267 any chance of the small end of separator 266 striking the edge of band 269 or the rim of spider 260 is avoided as the filler slides along on top of it, being held down either by a rib or ribs 268, or by any of the other constructions hereinbefore described.

I can apply my idea to a beater roll as shown in Figs. 13, 14, 15 and 16.

A decided advantage of using my endwise driven wedge shaped separators on beater rolls is that such separators can be made considerably longer than the bars, and these can be driven in thus avoiding any other fitting, any projecting ends being then readily cut off.

In this case the beater bars 270 are locked in place to the spiders 271 forming the beater roll body in any usual way and have recesses 272 to receive projections 273 from wedge shaped metal side fillers 274 which are wedge shaped from the top downward and from each end inward as shown in Fig. 15. It is obvious that these side fillers might be integral with a bar 270 making a beater bar like the Jordan bar shown in Fig. 9.

After these metal fillers are put in place the separators 277 and 277 of inverted keystone cross section and wedge shape longitudinally are driven in the large end.

As shown in Figs. 14 and 15, the metal fillers 274 are the same length as the bars 270 and as the wooden separators 274 are passed in from the large end, shown in Fig. 15 as

from the right, they span and are supported by the right hand and center spider while their small end is being driven home over the left hand spider.

As shown in Fig. 16 however, in some cases where there are more than two spiders such as 371, 372, 373, while the bars 370 extend the length of the roll between 371 and 373, I may use in connection with each bar, metal fillers 374 and 375, having their large ends resting on the metal spider 372 and tapering each in an opposite direction to the outside.

In such case I find it quite necessary to use a metal bottom filler 376 of thin metal which can be easily set in position after which a separator 377 of wood or other material, and of wedge shape lengthwise, and keystone shape cross wise, can be driven in position.

Figs. 17, 18, 19 and 20 illustrate various other types of construction which I may use, all illustrating my invention of combining, with a roll for paper making machines having a body, two bars, each attached at its bottom edge to the body, one of said bars having an alined longitudinal projection and said bars being so arranged that their sides, which face each other, converge, and a separator of wedge shape driven between said bars and engaging said projections in such a manner as to prevent the radial displacement of the separators.

In Fig. 17, 81 represents the body to which at one edge the bars 80, 80 are attached, each bar having cross shaped projections 82, under which is driven separator 83.

In Fig. 18, 91 is the body to which at their bottom edges are fastened bars 90, each having cross shaped projections 92 from below which the sides 94, 94, converge. The separator 93 is so cut that its top is level with the top faces of the projections 92 while in Fig. 17 the top face 83 is below projections 82.

Moreover in Fig. 18 the sides 94, 94 of adjoining bars may be perfectly parallel, but at the same time the separators will be locked in position and can be driven in from the end.

In Fig. 19, bar 84 has projections 85, 85, below which one side 87 is straight and the other, 86, approaches thereto.

In Fig. 20, 101 represents the body of a roll or plug of very small diameter to which only a few bars 100 are attached at their bottom edges. Each bar has the alined longitudinal projections 102 which fit into suitable grooves in adjoining separators 103. It will be observed that the top face 104 is much wider than the bottom face 105, the separators being held in place when driven in from the end by the ribs 102.

1. The combination with a Jordan engine plug having a curved surface in which are longitudinal slots; of a plurality of bars fastened so as to stand alone in said slots each having a part which projects from and is thicker outside than it is at the plug surface; and wooden separators of wedge shape longitudinally each of which is thicker at its bottom surface than at its top surface positioned between the bars and resting on the curved surface of the plug.

2. A bar for Jordan engine plugs having means at its bottom edge by which it can be attached to the plug body and which is of such form that when attached to a plug body of predetermined size, its thickness at some point outside its lines of contact with the surface of the plug body will be such as to hold separators positioned between two bars from radial displacement.

3. The process of assembling Jordan engine plugs which consists of attaching bars to the plug body by their bottom edges, each of which bars projects along its middle portion, and of then driving from the large ends, wedge shaped separators between adjoining bars and the plug body below said projections.

4. The process of assembling Jordan engine plugs which consist of attaching bars to the plug body by their bottom edges so that each bar will stand alone, each bar having an alined longitudinal projection, and of then driving from the large ends, separators of wedge shape as viewed from the top, between adjoining bars each separator being so formed as to engage a longitudinal projection of a bar.

5. The combination with a roll for paper making machines having a body; of two bars each attached at its bottom edge to said body; one of said bars having an alined longitudinal projection and said bars being so arranged that their sides which face each other, converge; and a separator of wedge shape longitudinally and laterally driven in from the large end between said two adjoining bars, and engaging said projections in such manner as to prevent the radial displacement of the separator.

6. The combination with a roll for paper making machines having a body; of two bars each attached at its bottom edge to said body; said bars being so arranged that their sides which face each other, converge each in straight lines longitudinally one of said sides having a projection which extends parallel with and between its top and the top of the fastening means; and a separator of wedge shape longitudinally and laterally driven in from the large end between said two adjoining bars, and engaging said projections in such manner as to prevent the radial displacement of the separator.

7. The combination with a roll for paper making machines having a body; of a separator of wedge shape longitudinally and having side walls which lie in converging planes, a top face, and a bottom face which is wider at all cross sections than the top face.

8. A frustro-conical Jordan engine plug which has around its curved surface a plurality of slots which extend longitudinally from its large end, each adapted to hold alone a bar slipped in from the large end so that it stands up radially above the surface; a plurality of bars in said slots each bar having longitudinally alined means above the surface of the plug for holding separators from radial displacement; and a plurality of separators of wedge shape longitudinally, each separator being so formed on its side walls with alined means which engage the separator holding means of the adjoining bars that it cannot move radially of the plug, each separator being removable from the large end of the plug but not from the small end.

9. A bar for Jordan engines having sides which diverge above the middle line of its height and diverge on one side below such middle line.

10. The combination with a frusto-conical Jordan engine plug which has around its curved surface a plurality of slots which extend longitudinally from its large end and converge towards its small end, each slot being smaller at the surface than at the inside and having sides which diverge; with a plurality of bars, each bar fitting a slot and positioned therein so that it stands alone, each bar also having sides which diverge at some parts above the surface of the plug; and a plurality of separators of wedge shape longitudinally and at some parts laterally so driven in between adjoining bars as to engage their diverging parts thereby partly filling the spaces between said bars.

11. The combination with a frustro-conical Jordan engine plug which has around its curved surface a plurality of slots which extend longitudinally from its large end and converge towards its small end, each slot being smaller at the surface than at the inside; with a plurality of bars, each bar fitting a slot and positioned therein so that it stands alone, each bar also having sides which diverge at some parts above the surface of the plug; and a plurality of separators of wedge shape longitudinally and at some parts laterally so driven in between adjoining bars as to engage their diverging parts.

12. The process of filling Jordan engine plugs having slots which extend longitudinally from end to end which consists of introducing a plurality of bars endwise into said slots and then driving wedge shaped separators endwise between the bars.

ARCHER LE ROY BOLTON.