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Lutz

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[54] **SHROUD FOR ASPHALT MIXER PADDLE**

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[52] **U.S. Cl.** ..... **416/210,** 259/109, 259/178 R, 416/224

[51] **Int. Cl.** **B01f 7/04,** B28c 5/14

[58] **Field of Search** ..... 259/9, 10, 25, 26, 259/45, 46, 178 R, 178 A, 179, 109, 110; 416/198, 200, 204, 210, 224

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[57] **ABSTRACT**

A shroud to protect the shank of a mixing paddle of a heavy duty asphalt mixer in which the shroud is attached to the mixer tip without exposing the head of the bolt for presenting a smooth surface to the asphalt to increase the wear of the shroud and to reduce the drag on the mixing paddles for conserving power.

18 Claims, 9 Drawing Figures

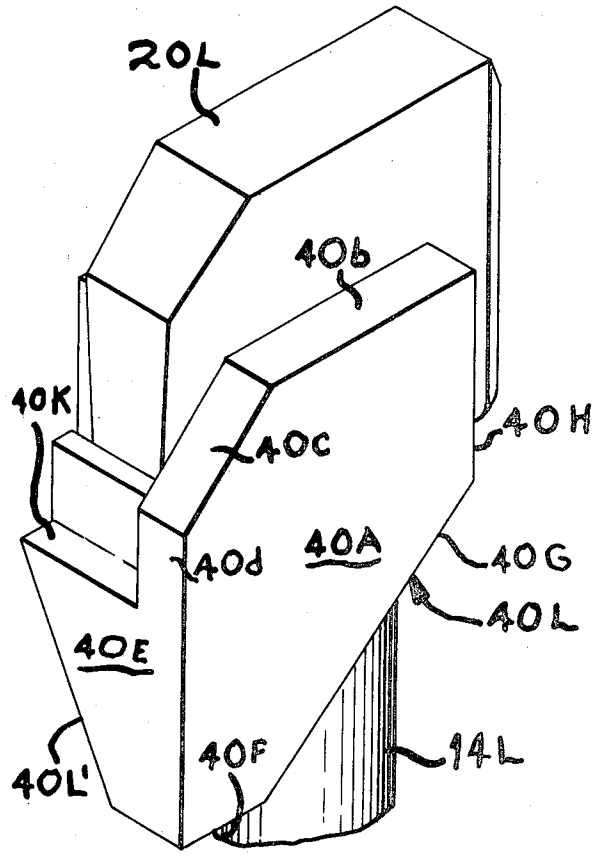


FIG_1

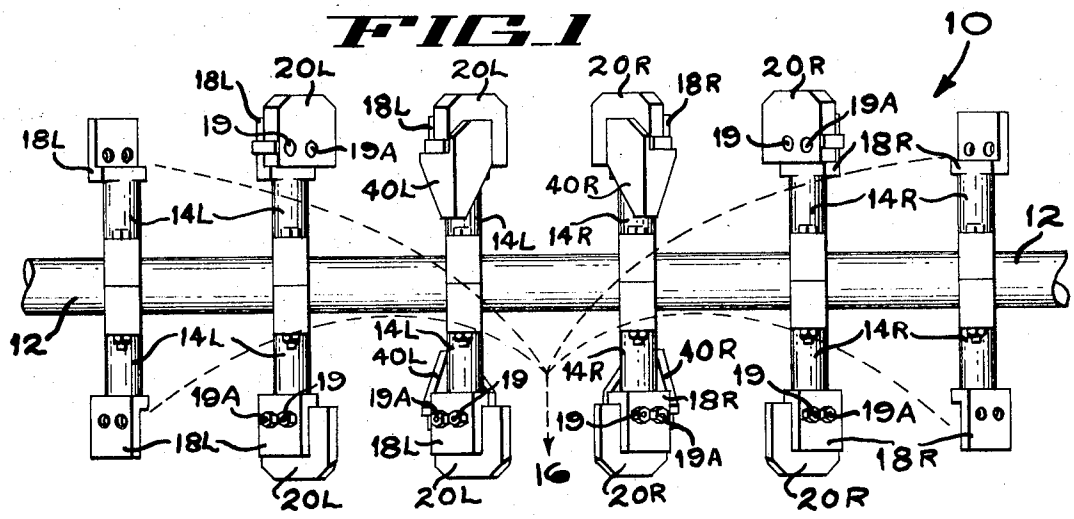
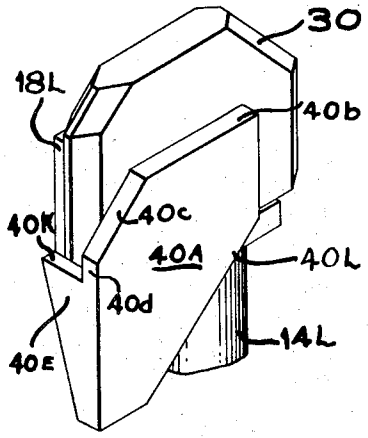


FIG_2



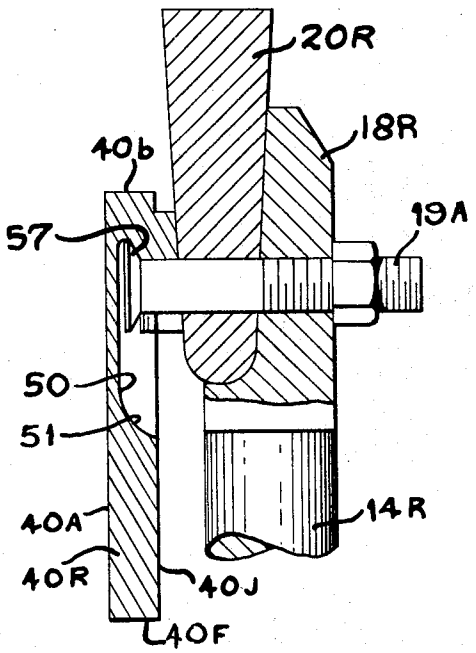


FIG_4

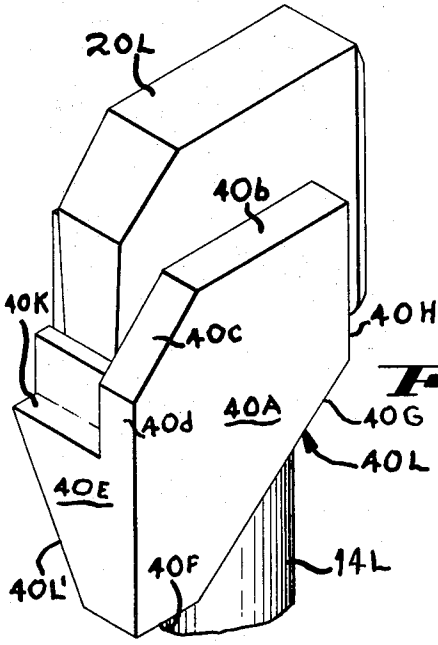


FIG_3A

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FIG_3

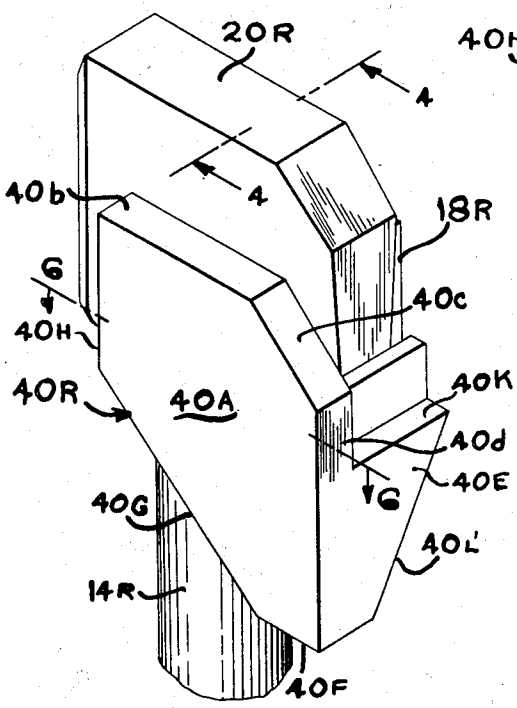


FIG_5

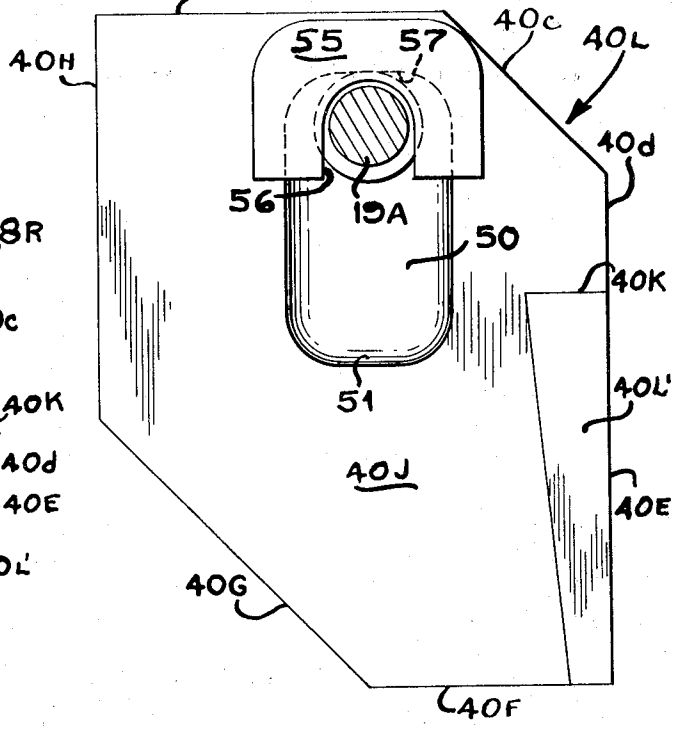


FIG_6

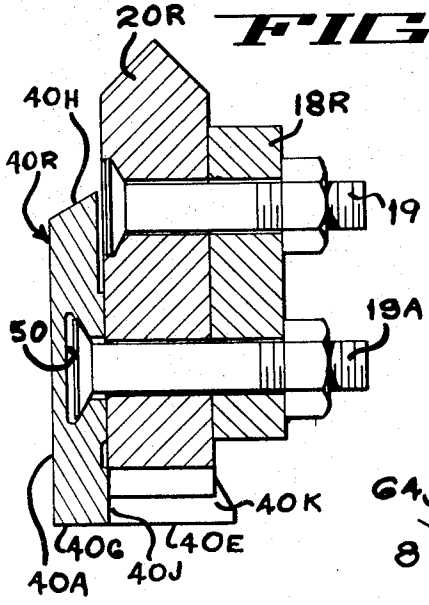
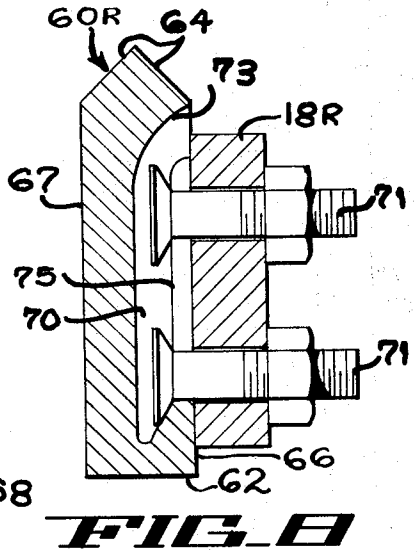


FIG_8



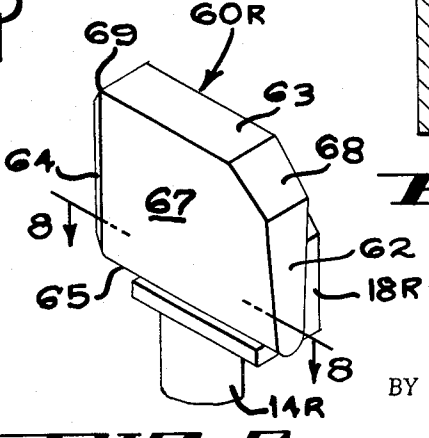


FIG_7

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SHROUD FOR ASPHALT MIXER PADDLE

BACKGROUND OF THE INVENTION

The present invention relates to shrouds for protecting the shanks of heavy duty mixers, such as mixers found in pavement asphalt mixer plants, and more particularly to a shroud that is attached to the mixer tip by a bolt without exposing the head of the bolt.

In preparing pavement asphalt, it is necessary to mix an aggregate, such as rock, with a cementing ingredient, such as liquid asphalt. The mixer carries a rotatable shaft with a plurality of radially extending shanks with each shank having a mixer tip thereon. The tips are arranged to direct the mixture toward a common discharge opening within the mixer. The shanks on one side of the opening carry left-hand tips, while the shanks on the other side of the opening carry right-hand tips so that the ingredients are simultaneously mixed and urged toward the opening from both sides thereof. Because of the high abrasion factors involved in the mixing of the aggregate and liquid asphalt ingredients, the shanks are subjected to considerable abrasion and wear, thus requiring frequent replacement.

Heretofore, replaceable shrouds have been attached to the tips to protect the shanks against excessive friction and wear. Replaceable shrouds attached to the left-hand tips have been designated left-hand shrouds and replaceable shrouds attached to the right-hand tips have been designated right-hand shrouds. Such replaceable shrouds were attached to the tips by means of nuts and bolts in which the bolts extended through the shrouds with the heads of the bolts exposed to the aggregate to be mixed.

When the bolt heads are exposed to the aggregate, the asphalt enters the bolt holes in the shroud to cause excessive wear of the shroud. In addition, the exposure of the bolt heads impeded the rotation of the mixer paddles and required excessive power for rotating the mixer paddles.

SUMMARY OF THE INVENTION

A replaceable shroud for a heavy duty mixer in which the head of the bolt attaching the shroud to a mixer tip is received by a recessed wall of the shroud and is retained therein by surfaces adjacent the recesses to present a smooth surface to the aggregate to be mixed.

By virtue of this arrangement, the tendency for the asphalt to enter bolt holes has been reduced. Hence, the wear on the shroud has been reduced and the shroud will last longer. Also, the asphalt contact surface of the shroud is relatively smooth. Therefore, there is a reduced impediment to the rotation of the paddles. It follows that there is a reduction of required power for the rotation of the paddles. Stated otherwise, the drag on the rotation of the paddles has been reduced.

A replaceable mixer tip for a heavy duty mixer in which the head of the bolt attaching the mixer tip to the shank is received by a recessed wall of the mixer tip and is retained therein by surfaces adjacent the recess to present a smooth surface to the aggregate to be mixed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary, diagrammatic elevation view of a mixer shaft with associated shanks, mixer tip mounting members, pugmill tips and shrouds of an asphalt mixer plant embodying the present invention.

FIG. 2 is an enlarged, fragmentary perspective view of a left-hand shank, a left-hand tip mounting member, a pugmill tip usable either on a left-hand shank or a right-hand shank, and a left-hand shroud embodying the present invention.

FIG. 3 is an enlarged, fragmentary perspective view of a right-hand shank, a right-hand mixer tip mounting member, a right-hand pugmill tip and a right-hand shroud embodying the present invention.

FIG. 3A is an enlarged, fragmentary perspective view of a left-hand shank, a left-hand mixer tip mounting member, a left-hand pugmill tip and a left-hand shroud embodying the present invention.

FIG. 4 is an enlarged, vertical sectional view of the shroud pugmill tip and mounting member taken along line 4—4 of FIG. 3.

FIG. 5 is an enlarged, rear elevation view of a left-hand shroud embodying the present invention.

FIG. 6 is a horizontal sectional view taken along line 6—6 of FIG. 3.

FIG. 7 is a perspective view of a pugmill mixer tip embodying the present invention illustrated with a shank and a tip mounting member.

FIG. 8 is an enlarged, horizontal sectional view of the pugmill mixer tip embodying the present invention taken along line 8—8 of FIG. 7, and illustrated with the tip mounting member therefor.

Illustrated in FIG. 1 is a rotor **10**, which is employed as an asphalt mixer for mixing ingredients of aggregate and liquid asphalt or other cementing materials commonly found in asphalt mixing plants. The rotor **10** includes a drive shaft **12** with a plurality of shanks **14** bolted to the drive shaft **12** and projecting radially therefrom.

For explanation purposes, it may be viewed that the dotted lines in FIG. 1 represent the path of the mixture travelling toward an exit **16**, at which point the mixture is to be discharged after the mixing operation is completed. The shanks to the left of the exit **16** are referred to as left-hand shanks **14L** and the shanks to the right of the exit **16** are referred to as right-hand shanks **14R**. For purposes of illustration, only the end shanks and tip mounting members are shown without pugmill tips or shrouds. The intermediate shanks and mixer tip mounting members are shown with the pugmill tips but without shrouds. The center shanks are complete with mixer tip mounting members pugmill tips and shrouds.

In operation, it is desirable that the rotor **10** simultaneously mix the liquid asphalt and aggregate while urging the mixture toward the exit **16**. For that purpose, the shanks **14L** and **14R** carry tip mounts **18**, respectively. The tip mounts **18** associated with the shanks **14L** are designated **18L** and the tip mounts **18** associated with the shanks **14R** are designated **18R**.

Detachably secured to the tip mounts **18L** and **18R** by bolts **19** and **19A** are pugmill tips or mixer tips **20**, which contact the aggregate and liquid asphalt for performing the mixing operation. Pugmill tips **20** may be designated **20L** for attachment to the tip mounts **18L** or may be designated **20R** for attachment to the tip mount **18R**. The tips **20L** and **20R** are well-known in the art. Alternatively a mixer tip or pugmill tip or pugmill tip **30** (FIG. 2) may be detachably secured to the mixer mounts **18L** and **18R** by bolts **19** and **19A** to contact the aggregate and liquid asphalt for performing the mixing operation. The mixer tips **30** may be detachably secured to either the left-hand mount **18L** or the right-

hand mount 18R. The construction and operation of the pugmill tip 30 is also well-known in the art.

For protecting the shank 14L against excessive wear from the mixing operation, a shroud 40L (FIG. 3A) embodying the present invention is detachably secured to the pugmill tip 20L or the pugmill tip 30 as the case may be. Likewise, for protecting the shank 14R against excessive wear from the mixing operation, a shroud 40R (FIG. 3) embodying the present invention is detachably secured to the pugmill tip 20R or the pugmill tip 30 as the case may be.

The shroud 40L (FIG. 3A) comprises a relatively smooth wall 40A that faces away from the pugmill tip to which the shroud 40L is attached. It is the relatively smooth outer wall 40A that contacts the ingredients during the mixing operation. At the upper portion of the shroud 40L is a transverse wall 40B that is joined by a downwardly directed angularly disposed wall 40C. The downwardly directed wall 40C is joined by an endwise wall 40D that has a section 40E of increased depth and of a substantially triangular configuration. The section 40E engages the end wall of the pugmill tip 20L or 30, as the case may be, for guiding the mounting of the shroud 40L on the pugmill tip and also to aid in stabilizing the attachment. The guide section 40E is in the nature of a guide flange and projects at right angles from the outer wall 40A. The guide flange also includes a horizontal wall 40K and a downwardly directed wall 40L' that joins the wall 40D and the wall 40K. A short transverse wall 40F continues from the section 40D and terminates at an upwardly directed wall 40G. A wall 40H parallel to the wall 40D joins the walls 40B and 40G. The wall 40G is angularly directed for proper fitting with respect to the shank 14L. It is the portion of the shroud 40L that includes the walls 40F and 40G that confronts the shank 14L to protect the same against excessive wear. The portion of the shroud 40L that includes the walls 40B, 40C and 40H that confront the associated pugmill tip.

An inner wall 40J (FIG. 5), which is parallel to the smooth surface outer wall 40A, confronts the associated pugmill tip, such as the mixer tip 20L or the mixer tip 30, as the case may be. According to the present invention, the inner wall 40J is formed with a recess 50, which is of sufficient depth to accommodate the head of the bolt 19A, which in the exemplary embodiment is a conventional plow bolt. See FIG. 5 for the recess 50 for the shroud 40R. Likewise, the width of the recess 50 is greater than the diameter of the head of the plow bolt 19A. To facilitate and guide the placement of the head of the plow bolt into the recess 50, a gradually sloping wall 51 is at one end of the recess 50. At the opposite end of the recess 50 from the guide wall 51 is a U-shaped bolt head retaining wall 55 (FIG. 5) that has a central opening 56 of a width less than the diameter of the head of the plow bolt 19A, but greater than the diameter of the threaded shank of the plow bolt 19A. In this manner, the head of the plow bolt 19A is held in the recess 50 by the restraining wall 55, while permitting the shank of the plow bolt 19A to project therefrom into the opening of the pugmill tip to which the shroud 40L is attached. A wall 57, shown more clearly in FIG. 4 for the shroud 40R, adjacent the recess 50 and the retaining wall 55 is angularly disposed to accommodate the angularly disposed wall of the head of the plow bolt 19A in a contour conforming relation.

The pugmill tip 20L or 30, as the case may be, includes two openings therethrough for receiving the plow bolts 19 and 19A. The tip mounting 18L also includes two openings aligned with the openings of the pugmill tip to receive the plow bolts 19 and 19A. Suitable nuts engaging the tip mounting 18L is threaded on the plow bolts 19 and 19A. The plow bolt 19 is shorter than the plow bolt 19A, which is shown in FIG. 6 for the shroud 40R. Hence, the head of the plow bolt 19 is received by a countersink opening in the pugmill tip and is disposed in even or flush relation with the wall of the pugmill tip confronting the shroud 40L. The plow bolt 19 secures the pugmill tip to the mounting tip 18L.

The plow bolt 19A is longer than the plow bolt 19 and the head of the plow bolt 19A projects outwardly from and is spaced from the wall of the pugmill tip confronting the shroud 40L. The head of the bolt 19A is inserted into the recess 50 and is retained therein by the retaining wall 55 for detachably securing the shroud 40L to the pugmill tip. The nut on the plow bolt 19 is adjusted to secure the pugmill tip to the mounting tip 18L so that the head of the plow bolt 19 is even with the outer wall of the pugmill tip and the nut on the plow bolt 19A is adjusted to secure the shroud 40L to the pugmill tip and the pugmill tip on the mounting tip 18L. It is to be observed that the bolt 19A does not extend through the shroud 40L, but is only received by the recess 50.

From FIGS. 3 and 3A it can be observed that the shrouds 40R and 40L are similar in construction and operation. The guide sections or flanges 40E, 40K, 40L' are on opposite sides of the wall 40J as are the end and side walls to accommodate a right-hand shank, as distinguished from a left-hand shank, and in certain instances to accommodate a right-hand pugmill tip, when the pugmill tips 20 are employed, as distinguished from a left-hand pugmill tip. For purposes of convenience, like walls with respect to structure and operation for the shroud 40R (FIGS. 3, 4 and 6) have been designated the same reference numeral as the corresponding wall for the shroud 40L (FIG. 3A).

Illustrated in FIGS. 7 and 8 is a pugmill tip 60R. The tip 60R is mounted on a tip mount 18R. The pugmill tip 60R comprises a solid block type segment having a leading edge surface or leading wall 62, a top edge surface 63, a trailing edge surface or trailing wall 64 and a bottom edge surface 65. In addition thereto, the mixer tip 60R is formed with and inner wall 66 (FIG. 8) that confronts the tip mount 18R on which it is detachably mounted and an outer wall 67 that faces oppositely from the inner wall 66. Angular surface 68 joins the surfaces 63 and 62. Angular surface 69 joins the surfaces 63 and 64.

Formed in the inner wall 66 is an elongated recess 70 that is parallel to the top surface 63 and the bottom surface 65 and extends intermediate the leading surface 62 and the trailing surface 64. The recess 70 is of sufficient depth to accommodate the heads of plow bolts 71 (FIG. 8). A gradually sloping wall 73 at one end of the recess 70 serves to guide the heads of the plow bolts 71 into the recess 70. Parallel, elongated retaining walls 75 on opposite sides of the recess 70 are parallel to the top surface 63 and the bottom surface 65 and extends along substantially the entire recess 70, but terminate at the sloping wall 73 to enable the heads of the bolts 71 to be inserted into the recess 70 while retaining and

holding the heads of the plow bolts **71** in the recess **70**. The space between confronting surfaces of the retaining walls **75** is less than the diameter of the respective heads of the plow bolts **71**, while the width of the recess **70** is larger than the diameter of the respective heads of the plow bolts **71**. The space between the confronting surfaces of the retaining walls **75** is greater than the diameter of the threaded shanks of the plow bolts **71** so that the threaded shanks of the plow bolts project outwardly from the inner wall **66** into respective bores in the tip mounting **18L**, whereby suitable nuts secure the pugmill tip **60L** to the tip mountings **18L** (FIG. **8**).

Thus, the outer wall **67** presents a smooth surface to the aggregate being mixed. The tendency for asphalt to enter the openings for the bolt heads is reduced, thereby reducing wear on the pugmill tips. Further, there is less impediment to the movement of the rotor and the lessening of the drag on the rotor to reduce power consumption.

The above concept is equally applicable to a right-hand pugmill tip, such as the pugmill tip **20R**. Only the left-hand pugmill tip **60L**, which is similar to the pugmill tip **20L** except for the bolt securing arrangement, has been described in detail for convenience only.

I claim:

1. In combination:

a. A rotatable shaft;

b. a shank mounted on said shaft for rotation with a free end of said shank projecting outwardly from said shaft;

c. mixer tip mounting means on the free end of said shank;

d. a mixer tip attached to said mixer tip mounting means, said mixer tip being formed with an opening therethrough;

e. a shroud supported by said mixer tip and extending beyond said mixer tip in the direction of said shank to protect a portion of said shank; and

f. a bolt received by said opening in said mixer tip with the bolt head thereof projecting toward said shroud,

g. said shroud having a wall thereof confronting said mixer tip, said shroud being formed with a recess in said confronting wall for receiving and disposing said bolt head within said recess for attaching said shroud to said mixer tip.

2. A combination as claimed in claim **1** wherein said recess has a width greater than the cross-sectional dimension of said bolt head to receive said bolt head, said combination comprising retaining means on said confronting wall of said shroud, said retaining means being disposed along confronting walls of said recess and being formed with an opening having a width less than the cross-sectional dimension of said bolt head and greater than the cross-sectional dimension of the rod of said bolt for holding said shroud on said bolt.

3. A combination as claimed in claim **2** wherein a nut on said bolt rod secures said bolt on said mixer tip and secures said shroud on said bolt to be supported by said mixer tip.

4. A combination as claimed in claim **3** wherein said shroud includes a second wall for contacting a mixture that faces in a direction away from said mixer tip, said second wall being generally smooth, said recess being spaced from the surface of said second wall contacting the mixture so as to leave said second wall uninterupted in presenting a generally smooth contacting surface to the mixture.

5. A combination as claimed in claim **3** wherein said mixer tip is formed with a countersink second opening facing said shroud and extending through said mixer tip, said combination comprising a second bolt with a bolt head seated in said countersink opening and extending through said mixer tip mounting means for attaching said mixer tip to said mixer tip mounting means, and a nut on said second bolt for securing said second bolt on said mixer tip mounting means for supporting said mixer tip on said mixer tip mounting means.

6. The combination as claimed in claim **5** wherein said recess includes a sloping wall for facilitating the entry of said bolt head into said recess.

7. A mixer tip comprising:

a. an inner wall;

b. an outer wall facing in a direction away from the inner wall, said outer wall being formed with an exposed surface facing in a direction away from said inner wall and spaced therefrom;

c. a leading wall extending between said inner and outer walls; and

d. a trailing wall extending between said inner and outer walls, said trailing wall being spaced from said leading wall,

8. A mixer tip comprising:

a. an inner wall;

b. an outer wall facing into a direction away from the inner wall, said outer wall being formed with an exposed surface facing in a direction away from said inner wall and spaced therefrom;

c. a leading wall extending between said inner and outer walls;

d. a trailing wall extending between said inner and outer walls, said trailing wall being spaced from said leading wall,

e. said inner wall being formed with a recess extending between said leading and trailing walls, said recess being formed to receive at least one bolt head and being spaced from the exposed surface of said outer wall; and

f. bolt head retaining means on said inner wall disposed along confronting walls of said recess.

9. A mixer tip as claimed in claim **8** wherein said recess has a width greater than the cross-sectional dimension of a bolt head to receive the bolt head, said retaining means being formed with a width less than the cross-sectional dimension of the bolt head and greater than the cross-sectional dimension of the rod of the bolt for holding the mixer tip on the bolt.

10. A mixer tip as claimed in claim **9** wherein said recess includes a sloping wall for facilitating the entry of the bolt head into said recess.

11. A mixer tip as claimed in claim **10** wherein said recess includes walls conforming to the contour of the bolt head.

12. In combination:

a. a rotatable shaft;

b. a shank mounted on said shaft for rotating with a free end of said shank projecting outwardly from said shaft;

c. mixer tip mounting means on the free end of said shank, said mounting means being formed with an opening therethrough;

d. a mixer tip supported by said mounting means, said mixer tip having a wall thereof confronting said mounting means, said mixer tip being formed with an elongated recess in said wall, said recess being spaced from said mounting means for enabling the radial displacement of a bolt head therein; and

e. a bolt received by said opening in said mounting means, said bolt having a bolt head received by said recess for radial displacement within said recess for attaching said mixer tip to said mounting means.

13. A combination as claimed in claim **12** wherein said mixer tip is formed with a leading wall and a trailing wall, said recess being formed to extend between said leading wall and said trailing wall.

14. A combination as claimed in claim **13** wherein said recess has a width greater than the cross-sectional dimension of said bolt head to receive said bolt head, said combination comprising retaining means on said confronting wall of said mixer tip, said retaining means being disposed along confronting walls of said recess and being formed with an opening having a width less than the cross-sectional dimension of said bolt head and greater than the cross-sectional dimension of the rod of said bolt for holding said mixer tip on said bolt.

15. A combination as claimed in claim **14** wherein a nut on said bolt rod secures said bolt on said mounting means and secures said mixer tip on said bolt to be supported by said mounting means.

16. A combination as claimed in claim **15** wherein said mixer tip includes a second wall for contacting a mixture that faces in a direction away from said mounting means, said second wall being generally smooth, said recess being spaced from the surface of said second wall contacting the mixture so as to leave said second wall uninterupted in presenting a generally smooth contacting surface to the mixture.

17. A combination as claimed in claim **16** wherein said recess includes a sloping wall for facilitating the entry of the bolt head into the recess.

18. A combination as claimed in claim **17** wherein said recess includes walls conforming to the contour of the bolt head.

* * * * *