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SLURRY SEAL DISTRIBUTING BOX

Filed Feb. 5, 1969

Fig. 2

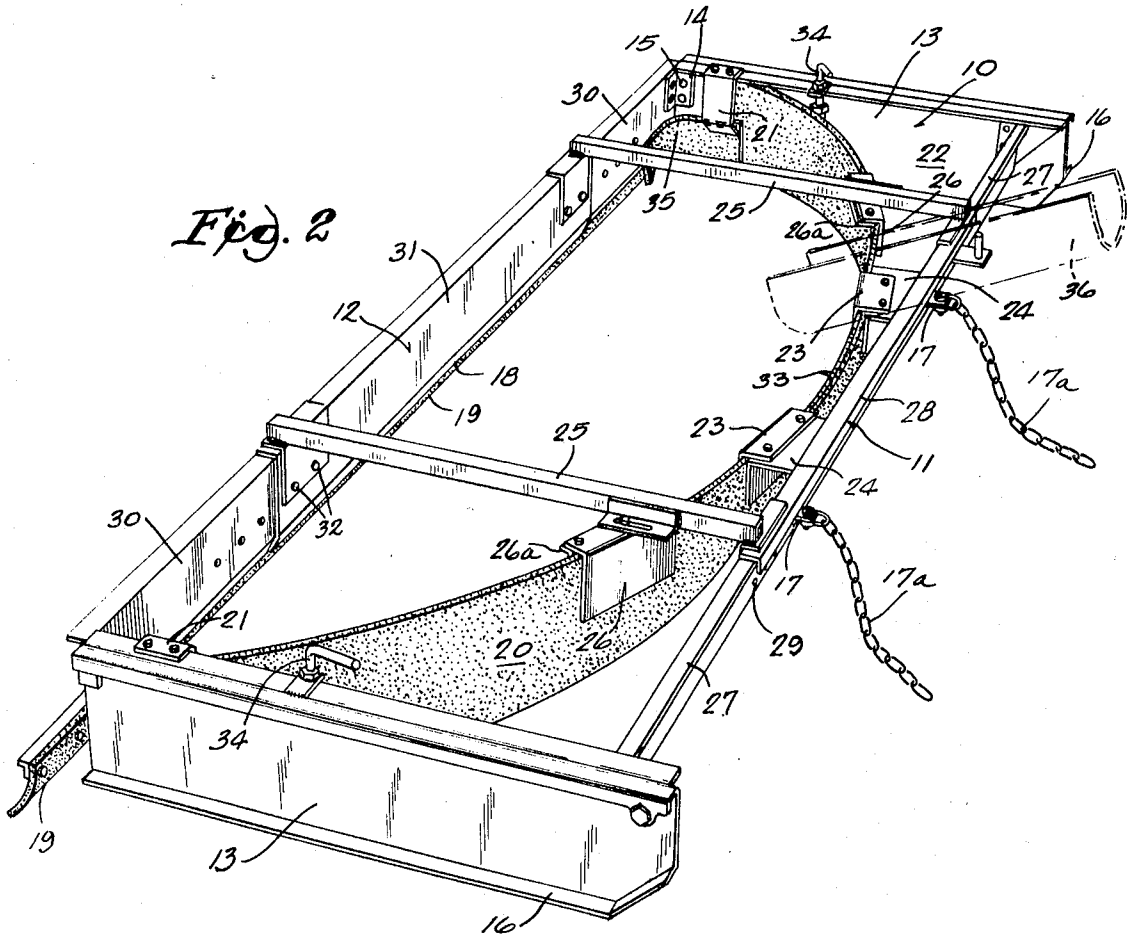
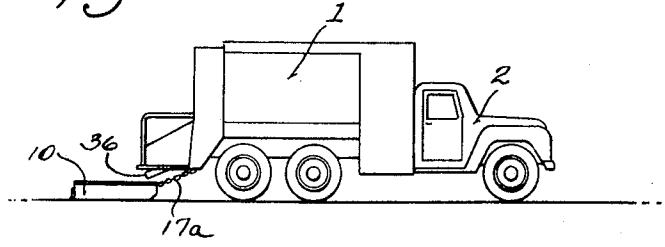


Fig. 1



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SLURRY SEAL DISTRIBUTING BOX

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ABSTRACT OF THE DISCLOSURE

A slurry seal distributing box particularly adaptable for use with slurries comprising a cationic asphalt emulsion. A rectangular box frame supports a generally semicircular intermediate retainer which, with the rear frame member and attached distribution squeegee, forms a slurry-retaining compartment. The semicircular shape of the compartment provides a more rapid flow of slurry to the rear corners, and the turbulence thereby created minimizes the occurrence of a premature "break" of the slurry. The box and retainer are readily adjustable for varying the width and can be quickly disassembled for cleaning.

BACKGROUND OF THE INVENTION

Field of the invention

The present invention pertains to the art of sealing the deteriorated surfaces of paved roads with a slurry comprising an emulsified asphalt, fine-grained aggregate and, optionally, portland cement. More particularly, the present invention is directed to a slurry seal distributing box which is towed by a supply vehicle and is adapted particularly to sealing a paved surface by depositing thereon a thin layer of slurry containing a cationic asphalt emulsion.

Description of the prior art

It is known in the art to seal a paved surface by towing a slurry-filled distributing box over the surface and allowing a thin layer of slurry to be extruded from under a laterally extending, surface engaging squeegee mounted on the rear of the box. Prior art boxes have been of generally simple construction consisting of a rectangular main frame having a lateral dimension corresponding to the width of the strip of slurry to be deposited. The longitudinal side frame members are substantially shorter and have surface-engaging runners which support the box for sliding movement behind the towing vehicle which also generally serves as the slurry supply vehicle.

The lower edges of the box frame members are provided with resilient surface-engaging sealing members to maintain the slurry within the box, the rear sealing member functioning as the squeegee under which the slurry is forced as the box is moved forwardly. Prior art boxes may additionally have an intermediate screed or retainer extending laterally across the center of the box between the longitudinal side frame members. The intermediate screed aids in controlling and equalizing the flow of slurry within the box from a central supply point at the front of the box uniformly across the width of the box to the rear squeegee.

Prior art slurry boxes have served adequately for sealing surfaces with slurries containing an anionic or negatively charged asphalt emulsion. In recent years, however, anionic asphalt emulsions have been replaced in slurry seals by cationic or positively charged asphalt emulsions. This change has been made because cationic emulsions have been discovered to exhibit more desirable chemical properties in slurry seals. A cationic emulsion can be mixed with a much wider range of types of aggregates to form a slurry that will "break" or set very rapidly upon deposition on a surface to be sealed.

Although the rapid break of a cationic slurry is a very desirable property, it has been found that use of such slurries in distributing boxes of the prior art causes extensive and extremely undesirable build-ups of hardened slurry. The build-up tends to occur primarily in the corners of the box where the flow of the slurry is retarded and sluggish. Prior art slurry boxes having an intermediate screed have as many eight corners in which a cationic slurry will break and build up because of diminished flow. Not only is the hardened slurry difficult to clean from the slurry box, but, particularly in the rear corners, a build-up of hardened slurry will interfere with the smooth operation of the rear squeegee and cause unevenness and streaking in the layer of slurry deposited.

SUMMARY OF THE INVENTION

The slurry distributing box disclosed herein provides an optimum means of spreading a slurry seal comprising a cationic asphalt emulsion. The invention resides in the novel configuration of the intermediate retainer which forms the forward and lateral walls of the slurry reservoir of the box.

The arcuate shape of the retainer provides a reservoir with a laterally diminishing cross section so that the slurry supplied to the box centrally thereof flows laterally in both directions with an increasing velocity. As a result, there is a more rapid and positive flow of slurry into the corners formed by the ends of the retainer and the rear cross member; and the turbulence created by the rapid flow precludes premature breaking or setting of the cationic slurry.

The arcuate configuration of the intermediate retainer eliminates the two forward corners of the slurry reservoir of conventional boxes, and the improved slurry flow characteristics obviate the need for an intermediate screed.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevation view of a slurry mixing and supply vehicle with a slurry distributing box of the present invention operatively attached to the rear thereof.

FIG. 2 is a perspective view of the slurry distributing box of the present invention viewed generally from a forward corner thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1, a slurry seal mixer **1** of a known type is mounted on the rear of a standard truck **2**. The mixer **1** may include storage hoppers and tanks for the various slurry ingredients and means for providing continuous batching and supply of the slurry. The slurry seal mixture is received from the mixer and spread onto the surface to be sealed by a slurry distributing box **10** of the

type disclosed herein. The distributing box **10** is connected to and towed behind the truck and attached mixer.

Referring to FIG. 2 the slurry distributing box **10** has a generally rectangular main frame comprising a forward cross frame member **11**, a rear cross frame member **12**, and a pair of side frame members **13**. The rearward ends of the side frame members **13** are demountably connected to the respective ends of the rear cross frame member **12** as with angle brackets **14** and threaded fasteners **15**. The forward ends of the side frame members are similarly demountably connected to the ends of the forward cross frame member **11**. The fastening means used to interconnect the main frame members may vary, the primary consideration being to provide means for rapidly disassembling the members for cleaning the fast-setting cationic slurry.

The lower edges of the side frame members **13** are provided with runners **16** adapted to support the slurry box **10** for sliding movement behind a towing vehicle and over the surface to be treated. To provide towing connection to the towing and slurry supply vehicle, a pair of draw chain clips **17** are attached to the face of the forward cross frame member **11**. Each clip **17** is adapted to receive the end of one of a pair of draw chains **17***a* which chains are attached by their opposite ends to the rear of the vehicle.

The rear cross frame member **12** is disposed with its lower edge **18** above the plane of the runners **16** or spaced from the surface to be treated. Attached to and extending downwardly from the lower edge **18** of rear cross frame member **12** is a rear squeegee **19**. The squeegee **19** comprises a continuous strip of relatively thick rubber or other suitable flexible resilient material and is adapted to engage, along the entire length of its lower edge, the surface to be treated. The squeegee **19** is bent or flexed in the rearward direction by the forward movement of the slurry box **10**. The slurry within the box is thereby extruded or squeezed under the squeegee **19** onto the surface in a thin layer.

Since the thickness of the layer of slurry deposited is dependent primarily upon the maximum size of the aggregate used in the slurry, the squeegee **19** is preferably fixed so that its lower edge just engages the surface to be sealed. The thickness of the layer may, however, be varied slightly by a vertical adjustment, up or down, of the squeegee **19**. Several means for providing this adjustment are known and used in the art. One means includes a jack-screw apparatus, such as at **34**, adapted to raise or lower the rear cross frame member **12** relative to the runners **16**, and another means includes a series of spring-biased adjusting screws by which the squeegee **19** is attached to the rear cross frame member. Either of these adjusting means may be used with a slurry box of the present invention, but neither of them are necessary, and they form no part of the invention.

The intermediate retainer **20** of the present invention is disposed within the rectangular main frame of the box and forms with the rear cross frame member **12** and attached squeegee **19** the slurry reservoir. The retainer **20** is formed of a heavy strip of rubber or other similar material as is the squeegee **19**. The retainer preferably has a width approximately equal to the height of the slurry box **10** and a length sufficient to provide the preferred arcuate configuration in its operative position within the box **10**, as will be described in more detail below. The retainer **20** may be and, depending on whether the box is adapted for variable width adjustment, preferably is comprised of two overlapping sections of substantially equal lengths.

The intermediate retainer **20** is secured in position within the box **10** by a series of clamps such that the retainer is vertically disposed with its lower edge coplanar with the runners **16** and the lower edge of the squeegee **19**; i.e., in contact with the surface to be treated. The ends of the retainer are secured to the rearward ends of the side frame members **13** by a pair of side frame clamps **21**. The clamps **21** are demountably attached to the upper edges of the side frame members **13** and extend downwardly therefrom so that the ends of the retainer **20** are clamped against the inside faces **22** of the side frame members **13**. From its ends the retainer **20** extends in an arcuate manner forwardly and inwardly within the rectangular main frame such that it is symmetrically disposed with respect to the longitudinal centerline of the frame. The midpoint of the retainer lies closely adjacent and in tangential relation to the forward cross frame member **11**.

The retainer is secured to the forward cross frame member **11** by a pair of cross frame clamps **23** similar to the side frame clamps **21**. The cross frame clamps **23** are demountably attached to a pair of triangular-shaped brackets **24** which are in turn secured to the forward cross frame member **11** on opposite sides of its midpoint. The brackets **24** have downwardly depending vertical faces against which the retainer **20** is clamped by the cross frame clamps **23**, said vertical faces being disposed to maintain the arcuate shape of the retainer.

A pair of intermediate braces **25** interconnect the forward and rear cross frame members **11** and **12**, respectively, to provide added structural rigidity to the slurry box. Attached to and depending downwardly from each brace **25** is a back-up pad **26** disposed intermediate each pair of clamps **21** and **23**. The back-up pads **26** provide additional support to the retainer **20** and aid in maintaining the arcuate shape thereof. The retainer **20** may, optionally, be secured to the back-up pads with demountable clamps **26***a*. The vertical surfaces of the pads **26** may be curved to conform more closely to the curvature of the retainer, a shown. However, since continuous curvature of the retainer over its entire length is not essential, the vertically disposed surfaces of the pads **26** may be flat. Thus, the retainer, though having a generally arcuate shape in its mounted position, may have portions which are flattened. In addition to the portions of the retainer which may be flattened by their abutment against the backup pads **26**, the portions by which the retainer is mounted with the clamps **21** and **23** may also be flat.

In operation, the pre-mixed slurry is poured or chuted directly into the reservoir formed by the intermediate retainer **20** and the rear cross frame member **12** and depending squeegee **19**. The typical slurry seal mix comprises an emulsified asphalt and a fine-grained aggregate. A small percentage of portland cement may also be included. The slurry is quite fluid in its mixed state and will remain so for a reasonable length of time if mixing or agitation of the mixed slurry is continued. As is particularly the case with a slurry containing a cationic asphalt emulsion, a rapid and irreversible break or set will occur on deposition of the slurry on the surface that is being treated. The arcuate shape of the intermediate retainer **20** provides a continuing mixing and agitation adapted to prevent breaking of the slurry within the reservoir.

The slurry is generally poured into the box centrally thereof and at a point just inside the forward cross frame member **11**, as by means of a chute **36** extending rearwardly from the back of the towing and supply vehicle. The flow of slurry into the reservoir is adjusted to correspond to the volume of slurry deposited on the surface with the forward movement of the box. In this manner the depth of slurry in the reservoir is maintained fairly constant. As the box is moved forwardly, the slurry flows generally radially toward the rear cross frame member **12** and attached squeegee **19**. As can be seen from the drawing, the shape of the retainer **20** conforms very nearly to the natural path of flow of the slurry from the supply point to the rear corners.

The arcuate retainer **20** eliminates, as a portion of the slurry reservoir, the areas within the main frame adjacent and including the forward corners; i.e. the corners formed

by the abutment of the forward cross frame member **11** and the side frame members **13**. Since these areas are outside the natural direct flow path of the slurry, elimination of them eliminates areas where, in prior art boxes, the flow of slurry is sluggish and the tendency of the slurry to break and build up is greatest.

The arcuate shape of the retainer **20** is also adapted to prevent an undesirable build-up of slurry in the rear corners of the box **10**. The longitudinal cross section of the slurry reservoir is of a laterally diminishing area and, as a result, the velocity of flow of the slurry from the central supply point increases laterally in accordance with the principles of fluid flow. The flow velocity is a maximum at or near the rear corners and is of a magnitude, within the range of forward operating speed of the box, sufficient to create a turbulence in the slurry which prevents a premature break and consequent build-up, particularly in the corners.

To allow selective adjustment of the width of the box, the forward and rear cross frame members **11** and **12**, respectively, are provided with telescoping extensions. Thus, the forward cross frame member **11** includes a pair of forward cross frame extensions **27** adapted to interfit telescopingly within the ends of the central section **28** of the member **11**. The extensions **27** may be slidably positioned to the desired width and secured in position, as by bolts **29** extending through a series of matching holes in the interfitting portions of the central section **28** and the extensions **27**. Similarly, the rear cross frame member **12** includes a pair of rear cross frame extensions **30** adapted to be slidably positioned within the ends of the intermediate section **31** of the member **12** and secured in position in a suitable manner, such as with bolts **32**.

Because of the arcuate shape and flexibility of the intermediate retainer **20**, the width of the box **10** may be varied within limits and as previously described merely by additionally adjusting the back-up pads **26**. Preferably, however, the box should be adjustable over a greater range of widths than is possible with a single-piece retainer **20**. Thus, the retainer comprises two substantially identical overlapping portions **33** of sufficient lengths so that the width of the retainer **20** may be adjusted to correspond to the selected width of the box without substantially changing the general arcuate shape of the retainer.

The improved slurry flow characteristics produced by the retainer **20** obviate the need for an intermediate screed. The elimination of an intermediate screed eliminates the forward portion of the two-part reservoir common in prior art boxes and, thus, four additional corners where slurry may prematurely set and build up.

To provide a more positive seal at the rear corners and to further facilitate cleaning, the box may be provided with corner seals **35**. These seals **35** are made of relatively short pieces of a material similar to that comprising the intermediate retainer **20** and rear squeegee **19**. The corner seals **35** are secured at one of their respective ends to the side frame members **13**, along with the ends of the retainer **20**, by clamps **21** such that the lower edges of the seals engage the surface upon which the box is resting. The seals are bent around the rear corners such that their opposite free ends lie against the ends of the rear cross frame member **12**. The pressure of the slurry in the reservoir, along with the inherent resiliency of the seal material, maintains the free ends of the corner seals in position. Alternately, the corner seals **35** may comprise integral extensions of the ends of the retainer **20**. In either case, the seals are readily removable with disassembly of the box to further facilitate simple and rapid cleaning.

Although the invention has been shown and described with reference to a particular embodiment, it will be understood by those skilled in the art that various changes may be made therein, in form and detail, without departing from the spirit and scope of the invention.

What is claimed is:

1. In an apparatus for applying a slurry seal mixture to a surface to be sealed including a prime mover operable in a given direction, a slurry receiving and distributing device comprising: a supporting frame, a flexible resilient retainer arcuately disposed within said frame and attached thereto by its ends and mid-portion such that said retainer is rearwardly open respecting the direction of operation, said retainer having a lower edge in contact with the surface to be sealed, and sealing means including a surface engaging squeegee operatively associated with said retainer to form a slurry retaining reservoir, said squeegee being deformable by the forward movement of said device whereby the slurry within said reservoir is extruded under said squeegee in a thin layer onto the surface to be sealed.

2. The invention of claim **1** wherein said supporting frame comprises a pair of longitudinally extending surface engaging side frame members and a forward cross frame member demountably interconnecting the forward ends of said side frame members.

3. The invention of claim **2** wherein said sealing means further includes a rear cross frame member demountably connected by its ends to the rearward ends of said side frame members.

4. The invention of claim **2** wherein said retainer is demountably attached to said supporting frame.

5. The invention of claim **3** wherein said cross frame members and said retainer are laterally extensible whereby the width of said device may be selectively varied.

6. A slurry seal distributing box adapted to be moved over a surface to be sealed, comprising: a pair of longitudinally extending surface engaging side frame members, a forward cross frame member interconnecting the forward ends of said side frame members, a rear cross frame member interconnecting the rearward ends of said side frame members, a flexible resilient intermediate retainer arcuately disposed within said interconnected frame members and attached by its respective ends to the rearward ends of said side frame members and by a portion intermediate its ends to said forward cross frame member such that the lower edge of said retainer is substantially coplanar with the surface engaging edges of said side frame members, and a squeegee attached to and extending downwardly from the lower edge of said rear cross frame member such that the lower edge of said squeegee is substantially coplanar with the lower edge of said retainer and forms therewith a surface engaging static seal to retain the slurry therein, said squeegee being deformable by the forward movement of said box such that the slurry is extruded under said squeegee in a uniformly thin layer over its entire length.

7. The invention of claim **6** wherein said forward and rear cross frame members each comprise at least one pair of interfitting telescoping members laterally adjustable to selectively vary the width of said box and thereby vary the width of the layer of slurry deposited.

8. The invention of claim **6** wherein the ground engaging edges of said side frame members comprise a pair of runners adapted to support said box for sliding movement behind a towing vehicle.

9. The invention of claim **7** wherein said frame members are demountably interconnected and said retainer is demountably attached to said forward cross frame member and said side frame members.

10. The invention of claim **7** wherein said intermediate retainer comprises at least two overlapping portions whereby its length may be selectively varied to correspond to the selected width of said box.

11. The invention of claim **10** wherein said retainer is additionally supported intermediate its attachment to said forward cross frame member and its respective attach-

ments to said side frame members by a pair of adjustable back-up pads, whereby the arcuate configuration of said retainer may be maintained regardless of the selected width at which said box is operated.

12. The invention of claim 9 including a pair of demountable corner seals of a flexible resilient material each attached by one of its ends to the rearward end of one of said side frame members and adapted to be bent around the corner formed by said side frame member and said rear cross frame member and to rest against the inside surface thereof.

References Cited

UNITED STATES PATENTS

2,145,158	1/1939	Dammann	94—44 X
2,182,217	12/1939	Wahlstrom	94—44
2,224,084	12/1940	Mills	94—44
2,832,273	4/1958	Calabrese	94—46
3,237,540	3/1966	Suhr	94—46

NILE C. BYERS, JR., Primary Examiner