United States Patent

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[54] **QUICK CHANGE SCREED EXTENSION FOR PAVING MACHINES**

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[52] **U.S. Cl.** ..... **94/45 R**

[51] **Int. Cl.** **E01c 19/22**

[58] **Field of Search** 94/45, 46

[56] **References Cited**

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[57] **ABSTRACT**

The invention relates to an apparatus adapted to be attached to the screed of a paving machine, to form a lateral extension thereof. The construction of the screed extension particularly takes into account that it customarily will be installed and removed in the field, possibly by unskilled labor. Thus, provisions are made for the installation and removal of the screed extension, utilizing tools and equipment readily available in the field. Since the surfacing plate of the screed extension must align accurately with that of the main screed, an adjustable adapter plate is provided, which may be installed and adjusted in the first instance in the contractor's shop. Thereafter, mounting of the screed extension to the preadjusted adapter plate, is effected by a combination of tapered locating pins and keeper wedges.

8 Claims, 6 Drawing Figures

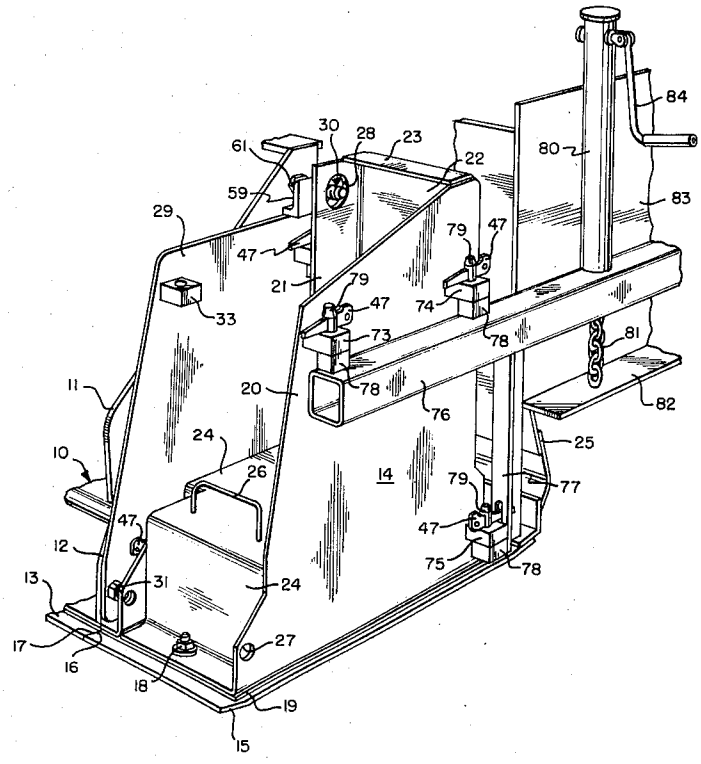


FIG. 1

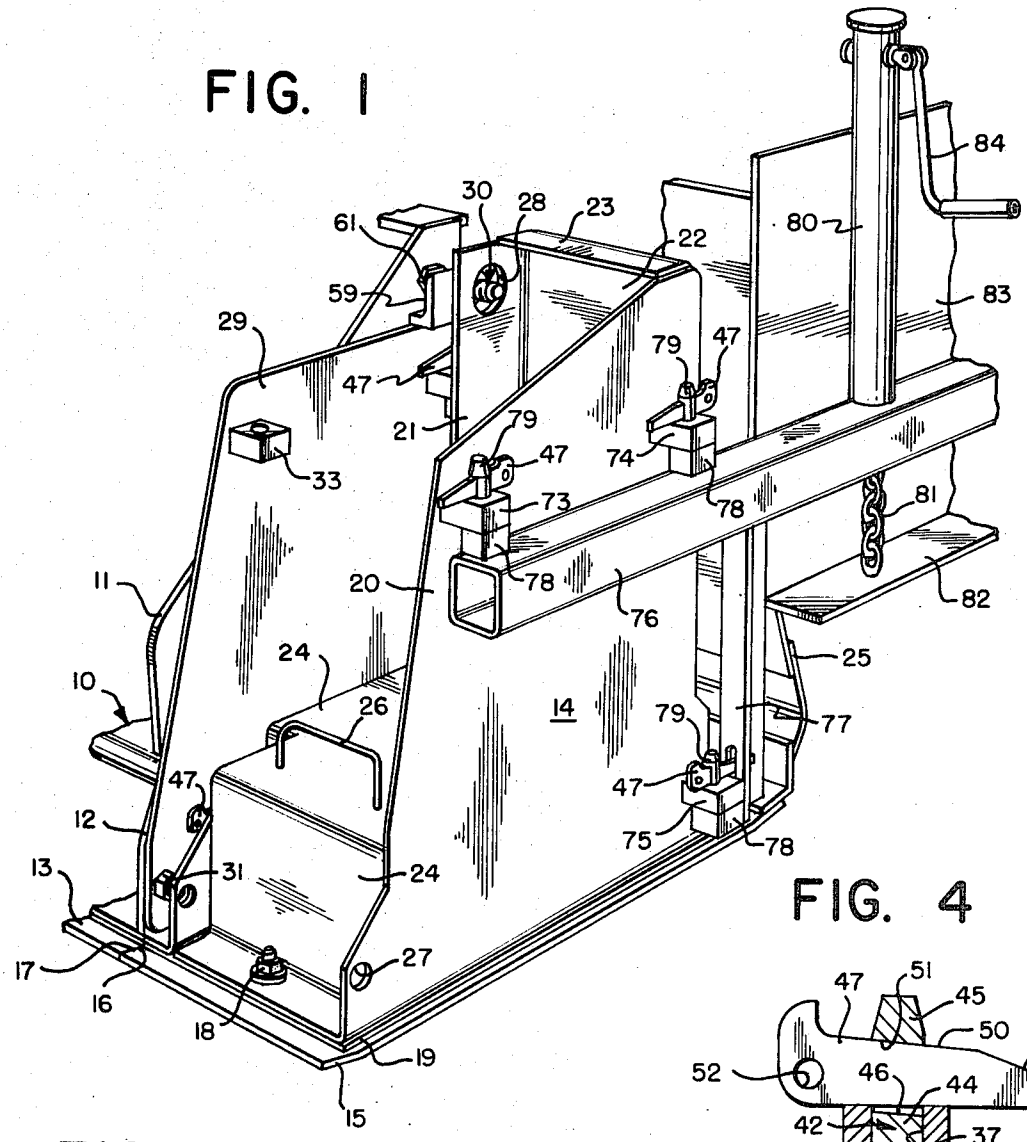


FIG. 4

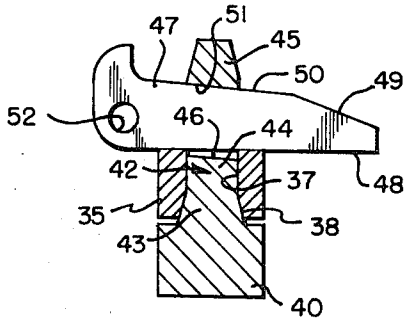


FIG. 5

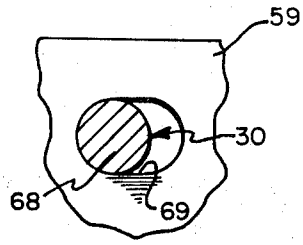
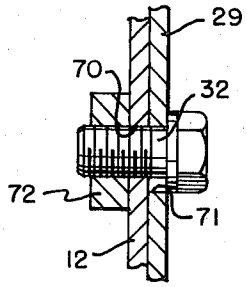


FIG. 6



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FIG. 2

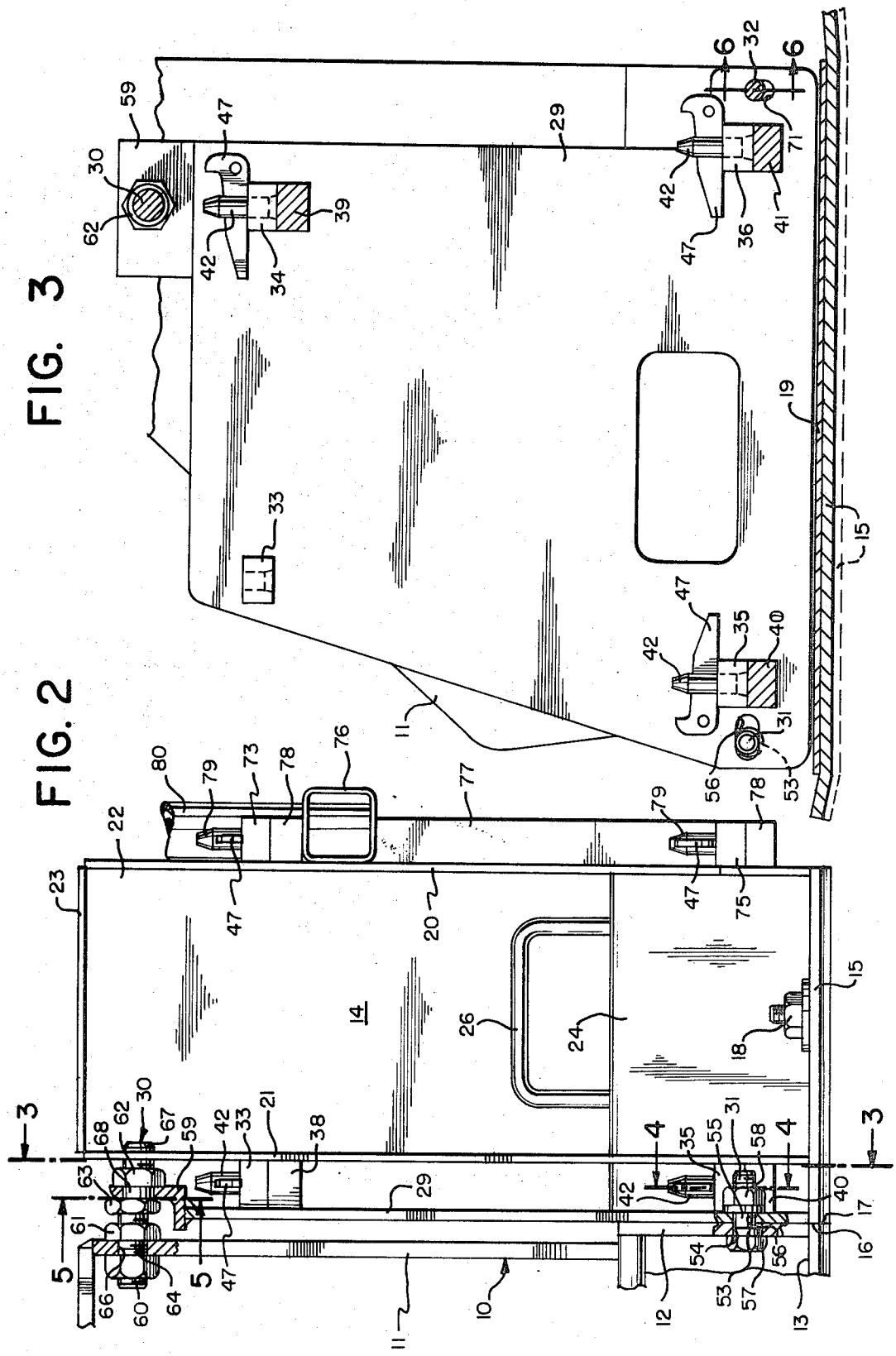


FIG. 3

QUICK CHANGE SCREED EXTENSION FOR PAVING MACHINES

BACKGROUND AND SUMMARY OF THE INVENTION

Paving machines conventionally used in the laying of asphalt pavements and the like typically include a screed which is drawn by the paving machine immediately behind facilities provided in the machine for depositing a supply of the paving material. The screed has a smooth bottom plate which is drawn over the deposited paving material and serves to level it into a smooth paving mat having desired grade and slope characteristics.

Since the width of paving mat to be laid by a paving machine frequently varies as a function of the width of the highway or highway lane, for example, paving machines conventionally are adapted to receive extension units. These extension units are arranged to be secured to the ends of the basic screed structure, to effect a lateral extension thereof.

In the past, the mounting and removal of screed extensions has been a rather time-consuming and annoying task, because of the need for effecting accurate alignment of the bottom plates of the basic screed and its extensions. Because such extensions frequently have to be mounted in the field, the quality and type of tools available may be less than adequate, and the work may have to be performed by relatively unskilled personnel. Thus, in the past, the mounting of a screed extension might well tie up the paving equipment for as long as fifteen minutes, and at times the surfacing plates of the screed sections may be excessively misaligned.

In accordance with the present invention, provisions are made for securing a screed extension unit to the end of a paver screed by simply bringing the screed and screed extension together in a manner such that a plurality of tapered locating pins on one of them, preferably the screed extension, are received in complementary tapered openings in the other unit, preferably the main screed. By reason of the tapered configuration of the locating pins and openings, precise positioning of the screed extension relative to the main screed is possible.

In the apparatus of the invention, the tapered locating pins are locked into the tapered openings by means of keeper wedges, which may be tapped into place by a hammer or other heavy device, which the contractor typically will have available in the field. Advantageously, the keeper wedges have a two-stage taper, providing a sharper angle in the leading portion of the wedge, to help force the locating pins and openings into properly seated relationship, and a low angle taper in the base portion of the wedge to effect secure frictional locking.

In accordance with one aspect of the invention, an adapter plate is provided, which is permanently secured to the end of the main screed of the paving machine by means including a plurality of eccentric studs. For the initial installation of the screed extension, the adapter plate may be carefully installed and aligned at the contractor's shop by manipulation of the eccentric studs. Once the proper alignment has been established, the eccentric studs are locked in place and the position of the adapter plate is secured. Thereafter, installation and removal of the screed extension may be effected without further regard to alignment.

For a better understanding of the above and other features of the invention, reference should be made to the following detailed description and to the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a screed extension assembly constructed in accordance with the principles of the invention.

FIG. 2 is an end elevational view of the apparatus of FIG. 1 taken at the left hand end thereof.

FIGS. 3, 4 and 5 are cross-sectional views taken generally along lines 3—3, 4—4 and 5—5, respectively, of FIG. 2.

FIG. 6 is a cross-sectional view taken generally along line 6—6 of FIG. 3.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring now to the drawings, and initially to FIGS. 1 and 2 thereof, the reference numeral 10 designates generally a fragmentary portion of end section of the screed of a conventional paving machine. The screed structure may include end plate sections 11, 12 and a bottom plate 13. As a general rule, the entire screed structure is drawn along behind a motor-powered paving machine by a pair of draw bar arms (not shown) connected to the paving machine well forward of the screed. In accordance with techniques and principles which are well known in the trade and need not be reiterated in this description, control over the transverse and longitudinal attitudes of the screed bottom plate 13 is effected by controlling the height of the pivot points connecting the draw bar arms to the machine and by controlling the angular relationship between the screed bottom plate 13 and the draw bar arms at the back of the machine. As the screed structure is drawn along behind the paving machine, the bottom plate 13 thereof is drawn over freshly deposited supplies of paving material, leveling the material to predetermined grade and slope specifications and to a desired average thickness specification.

Typically, a conventional paving machine will have a main screed structure 10, the width of which may not greatly exceed the overall width of the machine. However, for many applications, such as highway paving, it may be desirable to apply a mat of paving material in one pass of the machine which exceeds the width of the standard screed. For this purpose, it is conventional to provide screed extensions in various widths, which may be attached to the ends of the standard screed in selected combinations, to achieve extended-width screed assemblies of various desired overall widths.

In the apparatus of the invention, there is provided a screed extension unit, generally designated by the numeral 14, which is arranged for attachment in a novel and expedient way, to be described, to the end walls 11, 12 to the main screed 10. The screed extension unit 14 includes a bottom plate 15 whose cross-sectional configuration corresponds to that of the bottom plate 13 of the main screed and whose inner edge 16 is adapted to be brought into close fitting or abutting engagement with the outer end edge 17, of the screed plate 13. Thus, when the screed extension unit is properly secured in place, the bottom plate 15 thereof forms, in effect, a continuation of the main screed plate. Since the bottom plate 15 may be subject to considerable

wear, it may be removably secured to the frame structure of the extension unit **14**, as by means of suitable bolts **18**.

The frame structure of the screed extension unit advantageously includes a floor plate **19**, to which is secured, by welding or other means, an outer end wall plate **20** and a plate-like inner wall structure **21**. The unit also includes a front wall structure **22**, a short upper wall flange **23** and an internal bracing wall **24**. A front pusher wall **25** (fragmentarily shown only in FIG. **1**) is secured to the bottom plate **15** and also to the upper flange **23** for containment of the paving material deposited in front of the screed. A suitable hand grip **26** and hook openings **27, 28** may be provided to facilitate handling.

In accordance with the invention, an adapter plate **29** is rigidly and semi-permanently secured to the end wall structure **11, 12** of the main screed, by bolts **30–32**, in a manner to be described in more detail. The plate **29** is described as being "semi-permanently attached" in that, as a general rule, the adapter plate **29** is not removed or adjusted after its initial installation. However, it is possible to either remove or adjust the adapter plate at any time, if it is necessary or expedient to do so.

As shown particularly in FIG. **3**, the adapter plate **29** is provided with a plurality (four in the illustration) of socket lugs **33–36**. These lugs are welded or otherwise secured to the plate **29** and extend outward therefrom. As reflected in FIG. **4**, each of the lugs has a socket opening **37**, extending generally vertically therethrough which is expanded, in its lower portion, to form a downwardly divergent tapered socket **38**.

Rigidly secured to the inner wall structure **21** of the extension unit are lugs **39–41** having integral upwardly extending locating pins **42**. As reflected in FIG. **4**, the locating pins **42**, desirably are provided with downwardly divergent conical portions **43** at their base extremities, cylindrical central portions **44**, and upwardly convergent tapered end portions **45**. The arrangement is such that the locating pins may be readily inserted in the openings **37** in the socket lugs. When fully received in the socket openings, the tapered portions **43** of the pins will be firmly seated in the correspondingly tapered socket portions **38**, so that the pins are tightly and securely located relative to the socket lugs. In this respect, the tapered portions **43, 38** of the pins and sockets may have an included angle on the order of 30°, for example, to afford accurate location of the pins relative to the socket lugs along both the longitudinal and lateral axes of the pins, when the pins are firmly seated.

To advantage, the locating pins **42** are carried by the extension unit **14** and extend in an upward direction, such that installation of the extension unit is effected by upward movement thereof relative to the main screed, and removal of the extension unit is effected by downward movement of the extension unit relative to the main screed. A similar result could be achieved, of course, by mounting downwardly extending locating pins **42** on the adapter plate **29**, with upwardly opening socket lugs being carried by the extension unit. The illustrated arrangement is preferred, however, since the upper end extremities of the locating pins **42** are then accessible from above the socket lugs.

To lock the locating pins **42** securely in their respective socket lugs, the locating pins are provided with slotted openings **46** extending laterally therethrough for the reception of keeper wedges **47**. After preliminary assembly of the extension unit **14** with its respective locating pins **42** received at least partially in the socket lugs **34–36**, the keeper wedges **47** may be inserted in each of the locating pins and driven home by a hammer or similar heavy object. The wedging action of the keeper wedges **47** draws the pins **42** upward until the tapered portions **43, 38** are in tight fitting relation.

Advantageously, the keeper wedges **47** are provided with a two-stage taper. Thus, while the lower surface **48** of the wedge is generally flat, the upper surface is shaped to provide a leading portion **49** having a relatively sharp angle of taper (relatively larger included angle) and a trailing portion **50** having a relatively flat taper (relatively small included angle). The arrangement is such that the leading portion **49** of the wedge will help raise the locating pin **42** into the approximate desired position, while the trailing portion **50** will serve to draw the locating pin tightly into the tapered socket **38** and to lock it firmly in place by reason of the friction between the keeper wedge and the upper surface **51** of the pin opening. Typically, the wedges **47** are provided with openings **52** to receive chain lanyards or the like (not shown) by which the keeper wedges may be attached to the equipment.

As will be appreciated, the action of the keeper wedges **47** in drawing the locating pins **42** tightly into the socket lugs **34–36** serves accurately to locate the screed extension unit **14** relative to the adapter plate **29**. In order that the extension bottom plate **15** will, after assembly, be properly aligned with the main screed bottom plate **13**, a novel arrangement is provided according to the invention for initially effecting precise adjustment of the adapter plate **29** with respect to the main screed. To this end, the bolts **30, 31** by which the upper rear and lower front corner portions of the adapter plate are attached to the screed plates **11, 12**, are of eccentric form. Thus, as reflected in FIGS. **2** and **3**, the bolt **31** has a circular shoulder **53**, concentric with the bolt head, which is received in a circular opening **54** in the screed end wall **12**. The bolt also has an eccentric stud portion **55** which is received in a horizontally slotted opening **56** in the adapter plate **29**. By rotational manipulation of the bolt head **57**, the position of the eccentric portion **55** may be varied within the limits of its eccentricity. The forward and rearward components of this eccentricity are absorbed by the horizontal elongation of the slot **56**. However, the vertical dimensions of the slot **56** are such as to closely receive the eccentric stud portion **55**, and thus rotational movements of the bolt head **57** result in upward or downward adjustment of the lower forward corner portion of the adapter plate **29**. When the proper adjusted position is realized, the nut **58** is tightened, while retaining the rotational position of the bolt head **57**.

At the upper forward corner area, the adapter plate **29** is secured by an eccentric stud assembly **30**, one end of which engages the screed end plate **11** and the other end of which engages an offset member **59**. The stud member **30** includes three nuts **60**β and an integral hex portion **63**. The pair of nuts **60, 61** grips the screed

plate 11 and the nut 62 and hex portion 63 grip the offset member 59. When the nuts 60–62 are in a loosened condition, the hex portion 63 can be manipulated to change the rotational orientation of the stud 30. The left-hand extension 64 of the stud is received in a cylindrical opening 66 in the screed wall. The right-hand extension 67 is eccentrically related to the left-hand portion 64 and includes an eccentric cylindrical portion 68 received in a horizontally elongated opening 69 (FIG. 5).

When all three of the nuts 60–62 are loosened, the eccentric stud 30 may be rotated to effect raising or lowering of the back portion of the screed extension assembly, substantially as described in connection with adjustments of the lower eccentric bolt 31. When the proper height adjustment is realized, the nut 62 is tightened against the offset member 59, while the hex portion 63 is held, to lock the rotational orientation of the stud. A lateral tilting adjustment of the screed extension relative to the main screed thereafter can be effected by manipulation of the nuts 60, 61 to increase or decrease the spacing between the wall 11 and plate 29. Usually, this adjustment is used to bring the bottom plates 13, 15 into the same plane. However, in certain instances it may be desired to have a certain tilt of the plate 15 relative to the plate 13.

At the lower forward corner portion of the adapter plate 29, the bolt 32 (see FIG. 6) is received in a circular opening 70 in the main screed wall 12 and in a vertically elongated opening 71 in the adapter plate 29. During adjustments of the eccentric bolts 30, 31, the nut 72 and bolt 32 are maintained in a loosened condition. This permits the adapter plate to pivot about the bolt 32 during adjustments of the lower eccentric bolt 31 and to move vertically relative to the bolt 32 during rotary adjustments of the upper eccentric bolt 30. Thus, by a coordinated rotary adjustment of the eccentric bolts 30, 31, the inner edge 16 of the extension plate 15 may be brought into precise registry with the outer edge 17 of the main screed plate 13 in the desired manner, after which the eccentric bolts 30, 31 as well as the non-eccentric bolt 32 may be firmly tightened to retain the semi-permanent adjustment.

Conventionally, a paving machine will carry an edger plate at the side of and immediately in advance of the screed to prevent lateral flow of the paving material beyond the edges of the screed plate. To this end, the invention provides a novel arrangement for mounting of the edger plate means, enabling the edger plate to be quickly attached either to the screed extension or to the main screed itself if the extension is not in use.

As reflected in FIGS. 1 and 2, the screed extension has a set of socket lugs 73–75 extending outward from its side plate 20. The lugs 73–75 correspond in construction and location to the lugs 33, 34, 36 of the adapter plate 29. An edger plate mounting bar 76, typically of tubular construction, has welded or otherwise secured thereto a downwardly extending support leg 77. A plurality of lugs 78, mounting locating pins 79 which correspond in construction and function to the locating pins 42 of the screed extension, are carried by the tubular mounting bar 76 and leg 77.

To secure the edger plate mount 76–77 to the screed extension, the pins 79 are inserted in the socket lugs 73–75 and keeper wedges 47 are driven into place in the same manner as in the installation of the screed extension itself. The edger mount member 76 typically carries a pair of jack members 80 (only one of which is illustrated) from which chains 81 extend downward to engage the lower flange 82 of the edger plate 83. By means of hand cranks 84 or other means, the chains 81 may be raised or lowered to position the edger plate in the desired manner.

When the screed extension is not employed, the edger plate mount 76–77 is secured directly to the socket lugs 33, 34, 36 of the adapter plate.

The screed extension assembly of the invention is particularly advantageous in that it may be installed and removed in a few minutes' time, utilizing only the crudest sorts of tools, principally a hammer or similar heavy instrumentality to drive home and remove the keeper wedges 47. The arrangement enables the screed extension to be precisely aligned with the main screed of the equipment yet eliminates the alignment operation from the field installation procedure. Thus, the adapter plate 29 may be initially installed at the contractor's repair shop, where skilled personnel generally is available. At the job site, the installation and removal is simply a matter of inserting and removing the tapered locating pins 42 in the respective tapered sockets and driving home or removing the keeper wedges 47.

The arrangement of the invention is highly simplified, and therefore relatively inexpensive, and is of a rugged and durable nature consistent with the requirements of heavy construction equipment.

The system of the invention, in addition to providing a superior means of mounting and removing a screed extension unit in the field, also provides a compatible system for the mounting and removal of the associated edger plate assembly. The arrangement is such that the overall task of changing over the paving equipment for the laying of various widths of pavement mat is greatly simplified and expedited.

It should be understood, of course, that the specific form of the invention herein illustrated and described is intended to be representative only, as certain changes may be made therein without departing from the clear teachings of the disclosure. Accordingly, reference should be made to the following appended claims in determining the full scope of the invention.

I claim:

1. A screed extension assembly for a paving machine, which comprises

a. an adapter member for attachment to the main screed of the paving machine,

b. means for semi-permanently securing the adapter member to the screed in a preadjusted orientation, comprising first and second eccentric bolt means securing spaced portions of the adapter member to the screed,

c. a screed extension unit including a bottom plate and a side structure,

d. a plurality of complementary sets of tapered pins and sockets on the adapter member and on the screed extension side structure for joining said adapter plate and screed extension in predetermined alignment, and

e. wedge-like retaining means for securing said pins in said sockets.

2. The screed extension assembly of claim 1, further characterized by

a. said tapered pins extending entirely through and projecting beyond said sockets,

b. said tapered pins being provided with slotted transverse openings,

c. said wedge-like retaining means comprising keeper wedges received in said slotted openings and operative to force said pins tightly into said tapered openings.

3. The screed extension assembly of claim **2**, further characterized by

a. said tapered pins being carried by said screed extension and projecting generally vertically upward,

b. said sockets being formed by lugs on said adapter member and being generally vertically aligned for reception over said pins, and

c. said keeper wedges extending generally horizontally through said slotted openings, above said lugs.

4. The screed extension assembly of claim **3**, further characterized by said keeper wedges being formed to provide

a. a generally flat lower surface for engagement with said lugs,

b. a leading upper surface portion forming a relatively larger taper angle with the lower surface, and

c. a following upper surface portion forming a relatively smaller taper angle with said lower surface.

5. The screed extension assembly of claim **1**, further characterized by

a. one of said screed and adapter members having slotted openings of a first orientation for receiving said eccentric bolt means,

b. third bolt means securing said screed and adapter members at a point spaced from said eccentric bolt means, and

c. one of said screed and adapter having a slotted opening of a second orientation for receiving said third bolt means.

6. The screed extension assembly of claim **1**, further characterized by

a. said sockets being formed by lugs on said adapter member,

b. at least certain of said lugs being spaced and located alternatively to receive tapered pins of an edger plate mount,

c. said screed extension having an external side structure including lugs corresponding in spacing and location to said certain lugs, and

d. an edger plate mount having upwardly extending tapered pins adapted for alternative reception in said certain lugs of the adapter member or in the corresponding lugs of the screed extension.

7. A screed extension assembly for a paving machine, which comprises

a. a screed extension unit including a bottom plate and a side structure,

b. complementary sets of tapered pins and sockets oriented on generally vertical axes and associated with the paving machine screed and the screed extension for securing the screed extension to the screed in a predetermined orientation,

c. wedge-like retainers for securing the tapered pins and sockets in assembled relation,

d. adapter plate means mounted on one of said screed or screed extension and mounting the tapered pins or sockets associated therewith,

e. adjustable securing means for semi-permanently mounting said adapter plate means, and

f. said pins and sockets being so arranged that insertion of the pins into the sockets is effected by upward movement of the screed extension relative to the screed.

8. The screed extension assembly of claim **7**, further characterized by said adjustable securing means including

a. at least two eccentric bolts located in spaced relation for effecting upward and downward adjustment of the forward and rear portions of the adapter plate means, and

b. at least one bolt, which may be one of the above-mentioned eccentric bolts, providing laterally inward or outward adjustment of upper portions of the screed extension.

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