Dec. 31, 1946. J. D. FARRELL 2,413,302

BRACE STRUCTURE

Filed Feb. 23, 1944 4 Sheets-Sheet 1

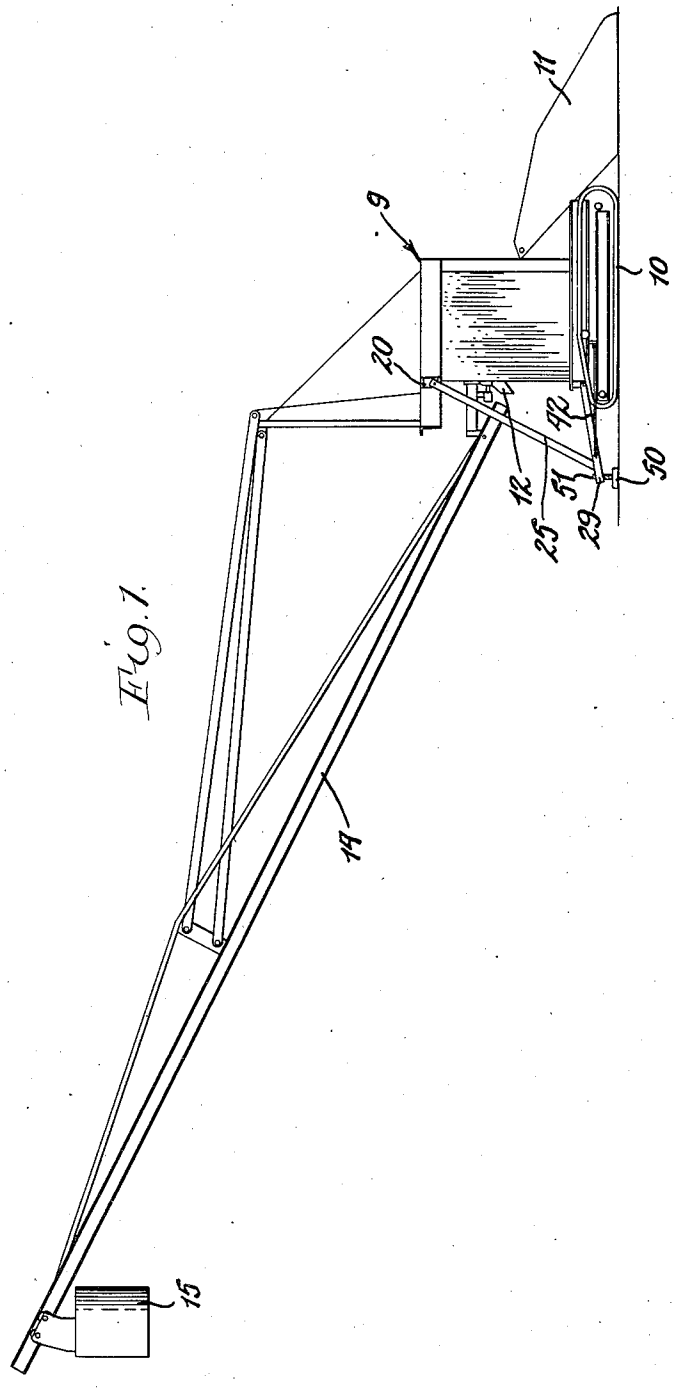


Fig. 1.

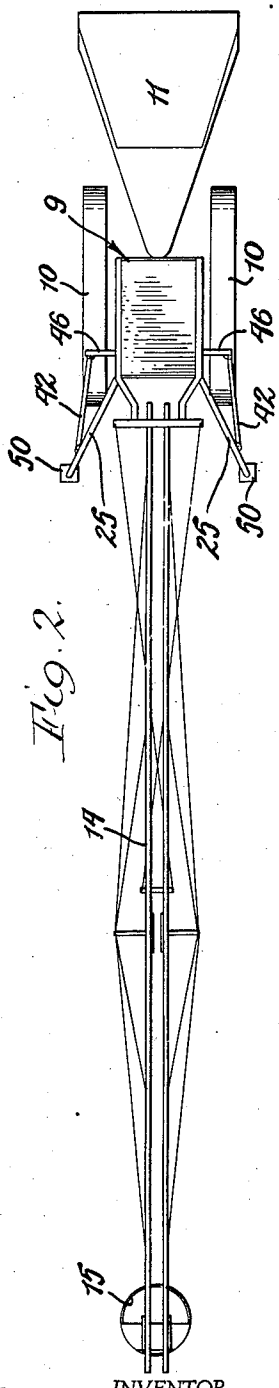


Fig. 2.

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BRACE STRUCTURE

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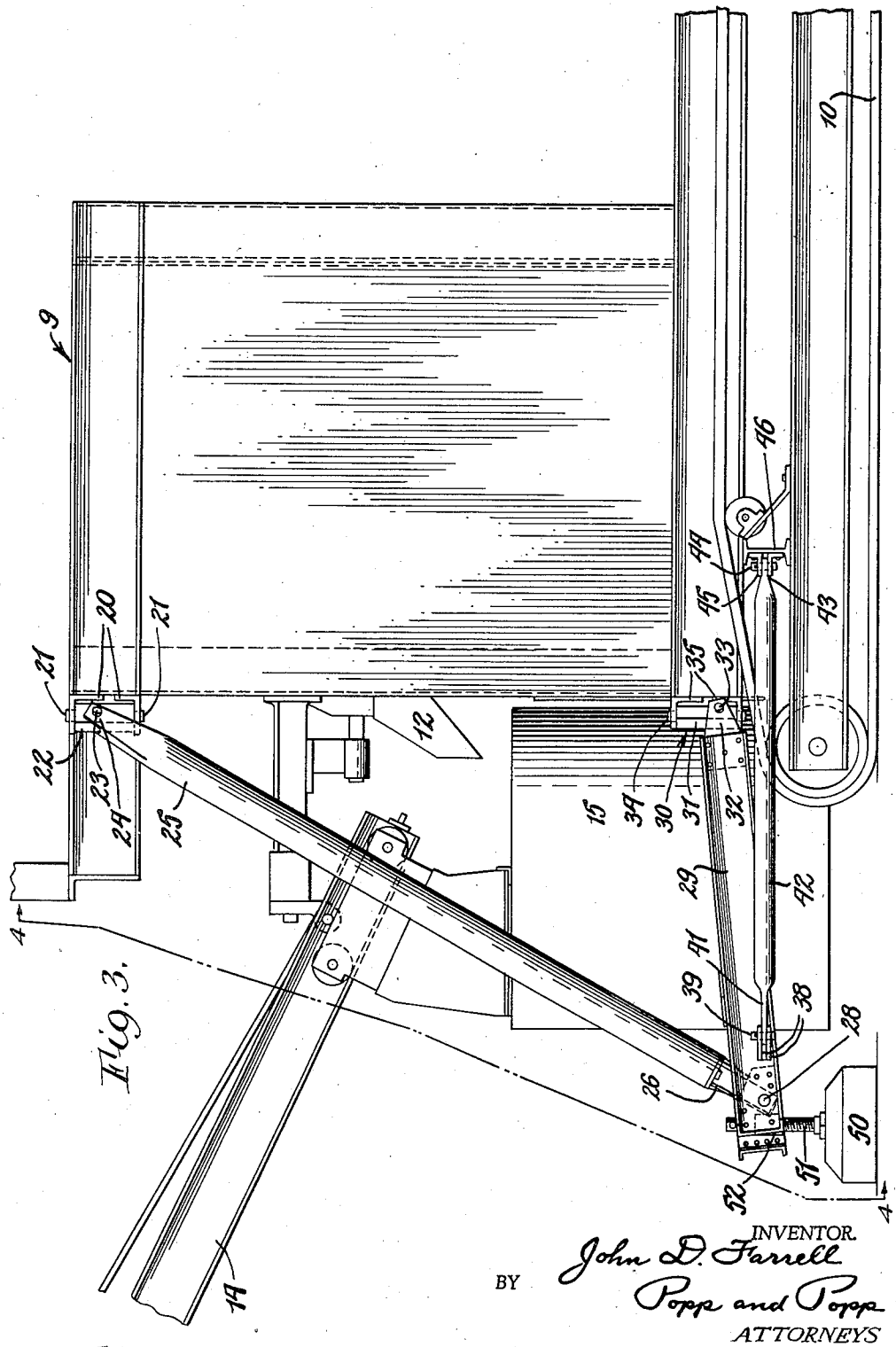


Fig. 3.

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BRACE STRUCTURE

Filed Feb. 23, 1944 4 Sheets-Sheet 3

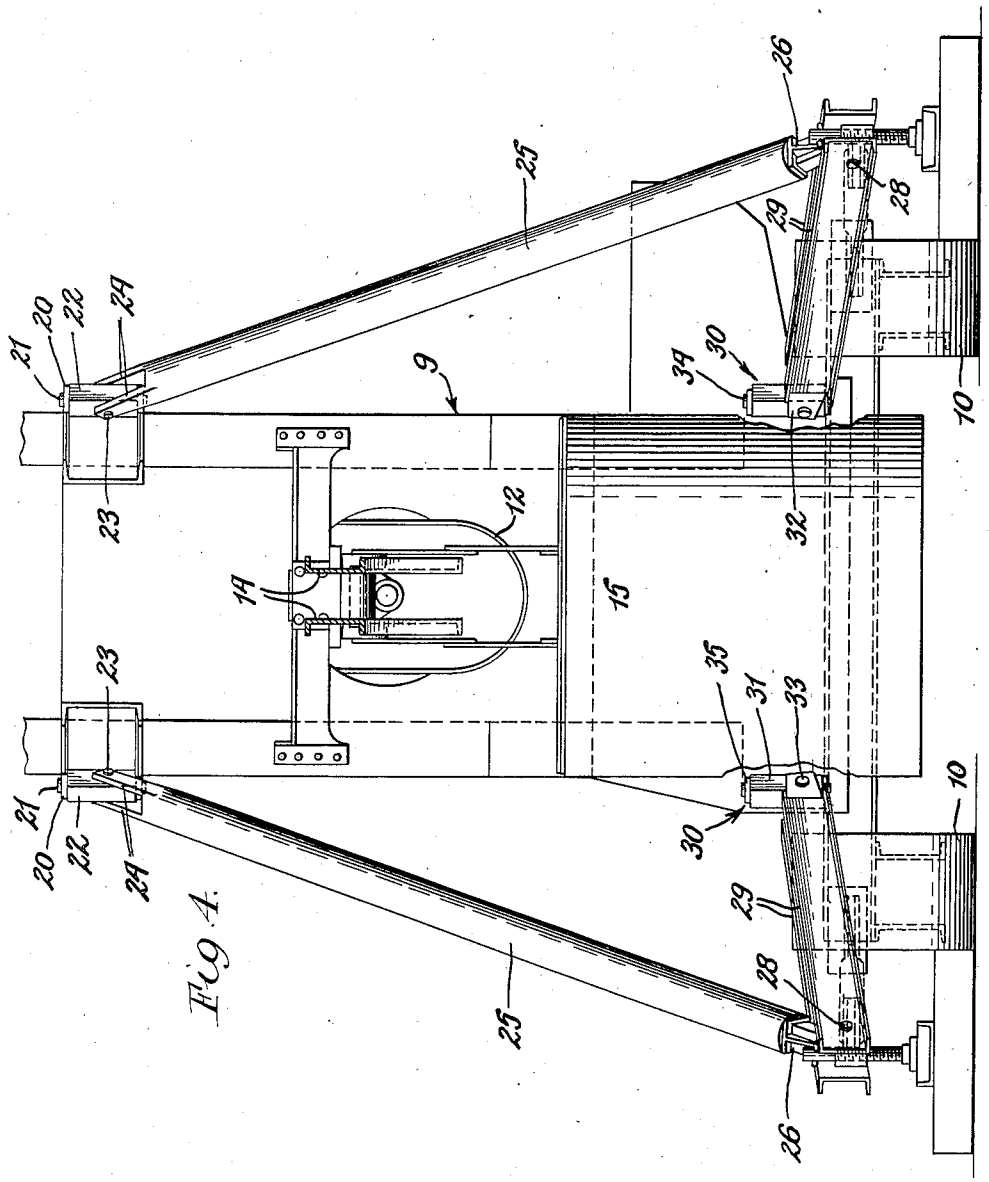


Fig 4.

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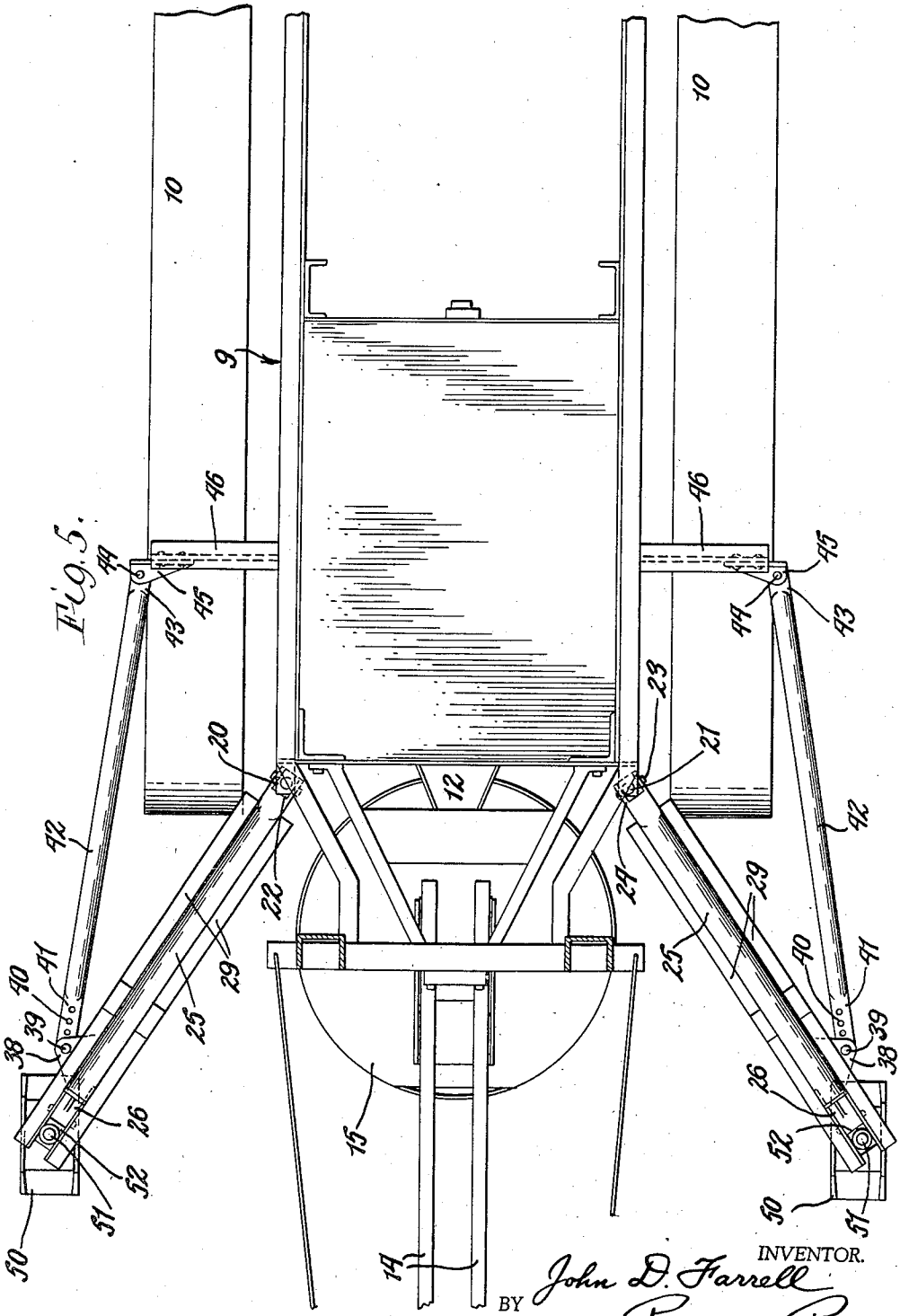
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Filed Feb. 23, 1944 4 Sheets-Sheet 4

Fig. 5.



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UNITED STATES PATENT OFFICE

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BRACE STRUCTURE

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Application February 23, 1944, Serial No. 523,522

1 Claim. (Cl. 212—145)

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This invention relates to concrete mixing and placing apparatus and more particularly to such apparatus which is mobile and which includes an unusually long boom along which the discharging bucket travels in delivering the mixed concrete from the mixing apparatus to the place where it is to be deposited.

Such extra long booms are demanded in mobile apparatus of the concrete paver type where it is desired to pour concrete for a building without erecting the usual scaffolding and concrete conveying apparatus, it being merely necessary to bring a concrete paver alongside the building and provide it with a sufficiently long boom to deliver its discharge bucket at the elevated central place or places from which the concrete is poured. After the building has been poured, the paver can be moved to the next building unit to provide the concrete for its construction in the same manner. However, with such an extra long boom the weight of the bucket at the outer end of the boom provides an excessive outboard weight which tends to tip the mobile body of the paver and render its use with such an extra long boom unsafe. While a heavier or counterweighted body for the paver might be provided this would be undesirable because it would interfere with the mobility of the paver and also be disadvantageous when using the paver for other purposes and with a shorter boom, as in road paving, and also because it would require redesigning the paver instead of merely putting a standard paver to a new use.

Accordingly it is one of the principal objects of this invention to provide an attachment for a standard mobile concrete mixer of the boom and bucket delivery type which permits of the use of an extra long boom for conveying the discharge bucket to remote places without danger of the weight of the bucket at the end of the extra long boom unbalancing or upsetting the body of the mixer in any way.

Another object is to provide such an attachment which will support the extra long boom against both vertical and lateral forces imposed on the mobile body of the paver by the loaded bucket at the outer end of the boom.

Another aim is to provide such an attachment which does not interfere with raising or lowering the boom and also permits the boom to be swung laterally through a long arc thereby to permit the boom to be readily maneuvered to suit the requirements of the particular work at hand.

Another purpose is to provide such an attachment which can be swung laterally or otherwise adjusted to permit the boom to be swung still further to one side or the other in meeting unusual placing requirements.

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Another object is to provide such an attachment which can be readily adjusted to any ground conditions encountered and which avoids the use of guy wires and their necessary anchorages.

Another object is to provide such an attachment which can readily be attached to or removed from the paver and can readily be transported from place to place along with the paver.

Another object is to provide such an attachment which is inexpensive in construction and which will stand up under conditions of severe and constant use without getting out of order or requiring repair.

Other objects and advantages will appear from the following description and drawings in which:

Fig. 1 is a side elevation of a standard paver having an extra long boom and having an attachment embodying the present invention to compensate for the weight of the discharge bucket when at the end of the extra long boom.

Fig. 2 is a top plan view thereof.

Fig. 3 is a fragmentary, enlarged view similar to Fig. 1 and showing the attachment embodying the invention in greater detail.

Fig. 4 is a vertical sectional view taken on line 4—4, Fig. 3.

Fig. 5 is a fragmentary, enlarged view similar to Fig. 2 and showing the attachment embodying the invention in greater detail.

The apparatus embodying the invention is shown as comprising a conventional concrete paver having a frame 9 carried by crawlers 10 and having a skip 11 which can be elevated to discharge the aggregate and Portland cement into a mixing drum, the discharge of which is indicated at 12. The skip, mixing drum and crawlers are driven by a motor (not shown) which also is employed to raise and lower the boom 14 and to move the bucket 15 along the boom to and from its discharging position. The details of the boom elevating mechanism and the drive for the bucket do not form part of the present invention and hence are shown conventionally.

However, it will be noted that the boom 14 is of exceptional length, the boom shown being 58 feet long, as compared with a standard length of 35 feet, and as attached to a conventional concrete paver as illustrated. The purpose of such an extra long boom is to enable the delivery of concrete at greater heights or at greater distances

than could be accomplished with a paver having a standard boom. Thus in pouring the concrete for multiple reinforced concrete building units, it is desirable to use a conventional concrete paver brought up alongside the forms for each building unit and to use the boom and bucket 14, 15 to discharge the concrete at a central place on top of the building for distribution to the various forms. After one building unit is poured, it is possible to propel the paver to the next unit and pour this next unit. For such use it was found, however, that the standard length of boom provided with a conventional concrete paver was too short to discharge the concrete at the desired elevation and hence the paver had to be provided with the extra long boom 14 as shown.

As will appear from the drawings, however, the weight of the filled bucket 15 at the outer end of the extra long boom 14 provides a greatly increased leverage tending to tip the entire paver around the front end of its crawlers 10 as an axis and also rendering the paver unstable laterally in the event the extra long boom is swung to one side of the center line of the paver. Since the paver and boom is heavy equipment, this condition is not only impracticable but also highly dangerous.

To compensate for the increased overturning moment caused by the extra long boom 14 and its bucket 15, two pairs of brackets 20 are secured by welding, or in any other suitable manner to the front end of the frame 9 of the paver on opposite sides of the boom and near the top of the frame, as best shown in Figs. 3 and 4. Each pair of these brackets 20 provides upper and lower flanges which journal the upper and lower vertical pins 21 of a universal block 22. Each of these universal blocks 22 is shown as carrying alining horizontal pins 23 to which are pivotally secured ears 24 provided at the upper end of a tubular brace arm 25. These brace arms 25 normally extend downwardly and laterally outward from the opposite sides of the upper front end of the frame or "toe out" and it will be seen that the universal connections provided by the universal blocks 22 permit of adjusting the distance to which these brace arms extend from the paver as well as the degree to which either or both brace arms extend laterally from the paver.

A knuckle fitting 26, in the form of a casting, is inserted and secured in the lower end of each of the brace arms 25 and is provided with a horizontal pin 28 which is arranged parallel with the corresponding pins 23. Each knuckle fitting is shown as square sided and as fitted between a pair of channel bars 29. These channel bars are disposed in a generally horizontal plane and extend toward the frame 9 of the paver and are secured thereto by universal joints 30 which are in general vertical alinement with the universal blocks 22 at the upper ends of the brace arms 25. As best shown in Figs. 3 and 4 each of the universal joints 30 is in the form of a block 31 interposed between ears 32 extending from the channel bars 29 and having horizontal pins 33 journaled in these ears. Each universal block 31 also has vertical pins or pintles 34 each of which is journaled in an L-shaped bracket 35 which in turn is welded to the lower front end of the frame 9 of the paver as best shown in Fig. 3.

To prevent lateral movement of each brace arm 25, a pair of ears 38 are welded to the outer face of the outer channel bar 29 of each pair and carry a vertical pin 39 which is removably inserted in one of a series of holes 40 provided in the flattened forward end 41 of a tubular brace rod 42, as best shown in Figs. 3 and 5. The rear end 43 of this tubular brace rod 42 is also flattened and is pinned, by a vertical pin 44, between ears 45 carried by lateral extensions 46 of the main frame 9 of the paver. The flattened end 41 of each tubular brace rod 42 is also arranged between the ears 38 of the corresponding channel bar 29 and it will be seen from an inspection of Fig. 5 that by withdrawing the pin 39 and selecting one or the other of the holes 40, the corresponding brace arm 25 and its channel bars 29 can be made to toe in more or less as conditions require.

The lower end of each of the brace arms 25 is provided with an adjustable foot 50 which is adapted to bear against the ground with a broad surface and which is provided with a threaded stem 51 screwed into a square nut 52 which is in turn welded or otherwise secured between the opposing faces of the outer ends of each pair of channel bars 29. Each stem 51 can be either fast or rotatably secured to the corresponding foot 50 and in either event it will be seen that turning the stems 51 will adjust the feet up or down to suit the particular ground conditions encountered. It will also be seen that by raising the feet 50, or by removing them entirely, the paver can readily be self propelled from location to location, this greatly facilitating the use of the paver since it is unnecessary to dismantle the entire brace structure. When so transporting the paver, the bucket 15 is, of course, withdrawn to its lowermost position illustrated in Figs. 3–5 and where it does not provide an outboard weight of great leverage as when at the outer end of the boom as shown in Figs. 1 and 2.

In use, the paver is propelled under its own power to location and the brace arms 25, channel bars 29 and brace rods 42 attached by inserting the pins which connect these members with the frame 9 of the paver. The brace arms 25 are then swung to the necessary angle to meet the lateral swinging requirements of the boom 14 or to suit its stationary position in the event that the particular conditions encountered require it to be set laterally at an angle to the longitudinal centerline of the paver. The screws 51 of the two feet 50 are then screwed down so that the feet are brought into firm engagement with the ground and the paver is ready for use.

As the filled bucket 15 moves to the outer extremity of the boom 14, its leverage force, which would tend to upset or overturn the frame 9 of the paver is compensated for by the brace arms 25 which, through the feet 50, provide an outrigger to resist such upsetting or overturning moments. Therefore the paver can be safely used with the extra long boom 14 with the advantage that the concrete can be lifted to greater elevations or conveyed greater horizontal distances than is possible with a boom of standard length.

From the foregoing it will be seen that the present invention provides an apparatus which adapts a standard concrete paver for use with an extra long boom and compensates for the upsetting or overturning moments caused by the use of such extra long boom. Further the bracing structure whereby this compensation is obtained is readily applied to the paver and removed therefrom and also can be readily adjusted to meet any particular conditions encountered.

I claim as my invention:

A brace structure for a mobile unit having a

frame, comprising a tubular brace arm extending downwardly, longitudinally and laterally from one side of said frame and having its upper end flattened and formed to provide a pair of spaced ears; means for pivotally connecting the upper end of said brace arm to the upper part of said frame and including a block pivotally mounted on said frame so as to be rotatable about a vertical axis, said ears embracing opposite sides of said block and a removable pin connecting said ears to said block; an adapter member partially extending into the lower end of said brace arm and connected thereto, the lower end of said adapter member having opposite vertical flat faces and being provided with a transverse hole extending therethrough; a generally horizontal bar assembly including a pair of spaced channel members arranged with their flat sides opposite each other; means for pivotally connecting the inner end of said pair of channel members to the lower part of said frame and including a second block pivotally mounted on said frame so as to be rotatable about a vertical axis, said flat sides of said channel members engaging opposite sides of said second block and a removable pin connecting said channel members to said second block; said lower end of said adapter member being arranged between said channel members near the outer ends thereof and the said flat faces of said adapter member engaging the flat sides of said

channel members, a removable pin carried by said channel members and being received by said transverse hole in said adapter member; a generally horizontal tubular brace rod arranged on one side of and extending along said frame, the opposite end portions of said brace rod being flattened; means for connecting one end of said tubular brace rod to the adjacent one of said channel members and including a pair of spaced ears secured to said adjacent one of said channel members and adapted to receive therebetween said one end of said tubular brace rod and a removable pin connecting said one end of said tubular brace rod to said last mentioned ears; means for connecting the opposite end of said tubular brace rod to said frame and including a third pair of spaced ears secured to said frame and adapted to receive therebetween said opposite end of said tubular brace rod and a removable pin connecting said opposite end of said tubular brace rod to said third pair of ears; one flattened end portion of said tubular brace rod being provided with a series of longitudinally spaced holes any one of which is adapted to receive the correspondingly one of said removable pins thereby to adjust the effective length of said tubular brace rod; and a foot mounted on the end of said bar assembly.

JOHN D. FARRELL.