Sept. 1, 1964 W. E. GRACE ETAL 3,146,686

SHOULDER ROLLER ATTACHMENT FOR ROAD ROLLERS

Filed July 23, 1962 3 Sheets-Sheet 1

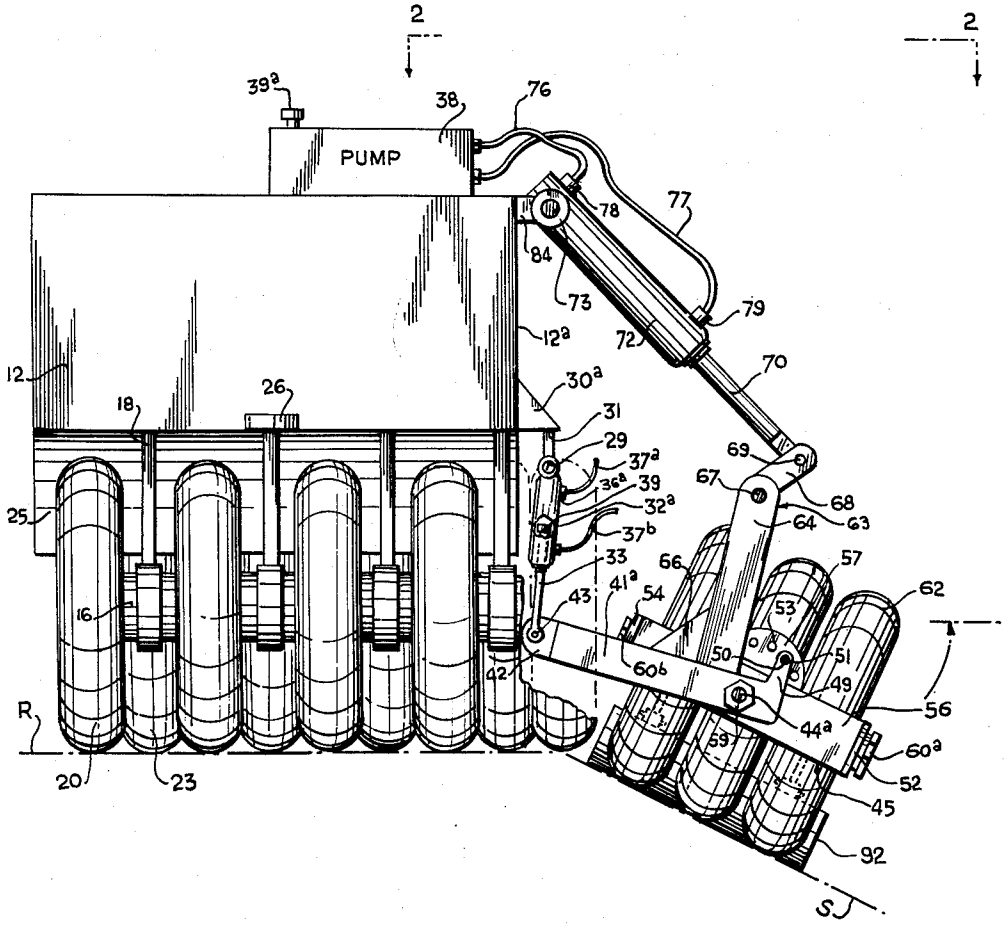


Fig. 1.

INVENTORS
WILLIAM E. GRACE
BY REUBEN H. ARNOLD
ATTORNEY

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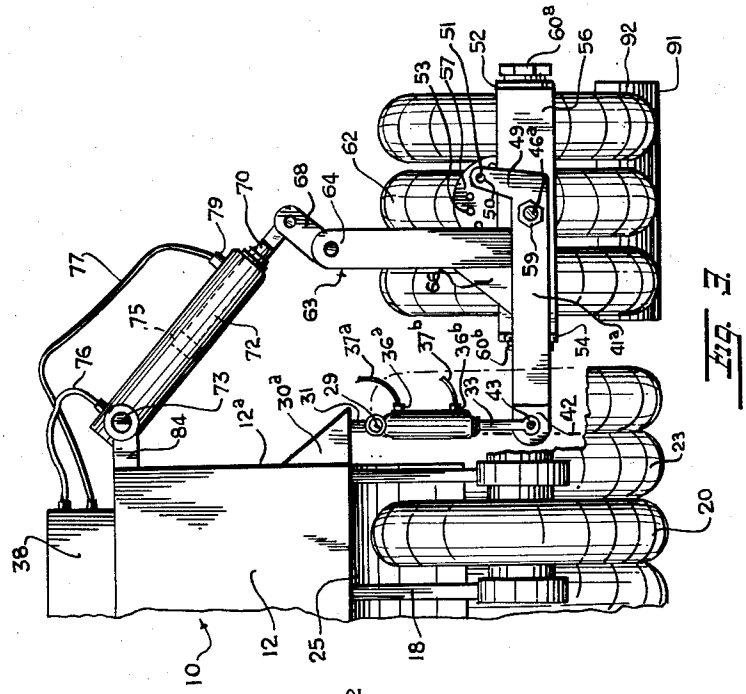


Fig. 1

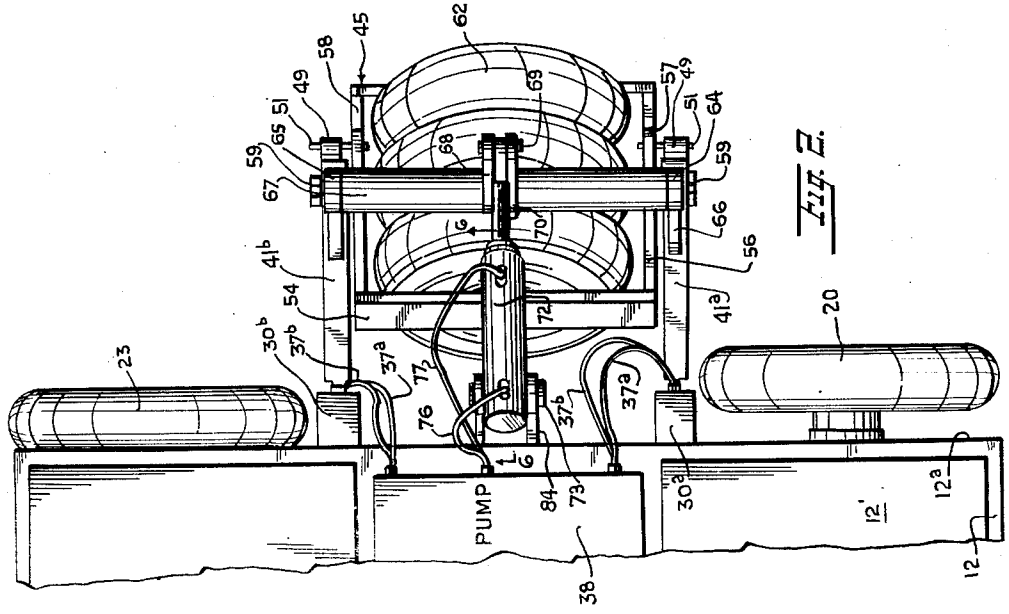


Fig. 2

INVENTORS
WILLIAM E. GRACE
BY REUBEN H. ARNOLD
ATTORNEY

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Filed July 23, 1962 3 Sheets-Sheet 3

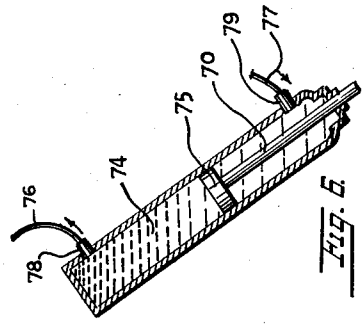


Fig. 6

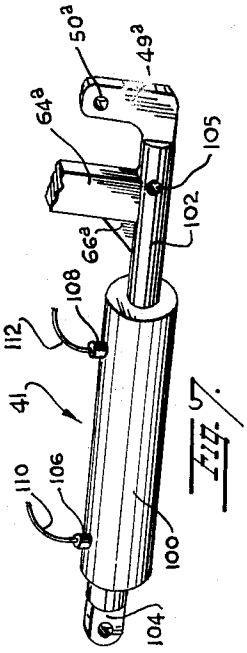


Fig. 5

Fig. 7

Fig. 8

INVENTORS
WILLIAM E. GRACE
BY REUBEN H. ARNOLD

ATTORNEY

United States Patent Office 3,146,686 Patented Sept. 1, 1964

3,146,686

SHOULDER ROLLER ATTACHMENT FOR ROAD ROLLERS

William E. Grace, 8239 Forest Hills Blvd., and Reuben H. Arnold, 313 S. Montreal, both of Dallas, Tex.

Filed July 23, 1962, Ser. No. 211,651
7 Claims. (Cl. 94—50)

This invention concerns an attachment for road rollers, particularly road rollers having pneumatic tires or smooth cylindrical rollers, for rolling a shoulder or slope at the side of a pavement or road surface.

It is usual in highway construction to provide a shoulder which slopes down to a side ditch at an angle which varies with the width of the right of way and depth of the ditch. It is difficult to compact shoulder slopes with known types of road rollers, since these are designed to roll flat or slightly crowned pavements. On steep lateral shoulder slopes they tend to tip over or slip down off the shoulders and drag shoulder material with them.

The present invention has as a principal object overcoming the difficulties and disadvantages encountered in rolling sloping shoulders with prior road rollers by providing an attachment which may be mounted on a conventional roller especially for rolling sloping shoulders.

A further object is to provide an attachment including a pivotally mounted frame which can be supported on a side of a road roller, the frame carrying a plurality of pneumatic tires or cylindrical rollers or wheels.

Another object is to provide an attachment as described with hydraulically operated means for elevating, tilting and extending the attachment.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIG. 1 is a front elevational view of a road roller with a shoulder roller attachment embodying the invention shown in lowered, inclined position.

FIG. 2 is a fragmentary top plan view taken on line 2—2 of FIG. 1.

FIG. 3 is a fragmentary front elevational view similar to a part of FIG. 1, showing the attachment in horizontal position.

FIG. 4 is a side elevational view of the road roller with the attachment in horizontal position.

FIG. 5 is a fragmentary rear elevational view of the attachment taken on line 5—5 of FIG. 4.

FIG. 6 is a sectional view through a hydraulic cylinder taken on line 6—6 of FIG. 2.

FIG. 7 is a perspective view of a telescopic, hydraulically operated link which may be used for the attachment.

Referring to the drawings, there is shown in FIGS. 1–4 a road roller 10 including a generally rectangular body 12 having an assembly of front wheels 14 rotating on an axle 16 carried by rods 18 secured to the underside of the body 12. The wheels carry pneumatic, inflated tires 20. At the rear of the roller is an assembly of wheels 22 rotating on an axle 21 supported by rods 24 secured to the underside of the body 12. The rear wheels have pneumatic tires 23. The body has a depending lower central section 25 between the wheels which carries ballast for loading the roller. The top of the body may be open as indicated in FIG. 2 to expose the interior 12′ of the body. The roller may be towed by a suitable tractor (not shown). An eye 26 mounted at the front of the body 12 can be engaged by a chain attached to the tractor. Tires 20 are spaced apart. Tires 23 are spaced so that they overlap the spaces between tires 20. Wheels 14 and 22 are removable by unscrewing nuts 15 from threaded ends of the axles. The roller can be provided with an engine for self-locomotion in known manner if desired. To the extent described the roller is conventional.

Secured to the outer side 12^a of the roller near front and rear ends of the central section are two brackets 30^a, 30^b carrying stationary depending posts 31. Two hydraulic cylinders 32^a, 32^b are pivotally secured by pins 29 to the posts. These cylinders have plunger shafts 33. The cylinders have fittings 36^a, 36^b at opposite ends. Flexible fluid conducting lines 37^a, 37^b extend from the fittings to a pump 38 on body 12. Valves 39^a, 39^b on the pump can be operated to extend the plunger shafts 33 simultaneously if fluid is forced into the cylinders through lines 37^a. The shafts 33 are retracted if the fluid is forced into the cylinder through lines 37^b. Part of cylinder 32^a is broken away in FIG. 1 to show piston 39 on the inner end of shaft 33. A similar piston is provided on the inner end of the shaft in cylinder 32^b.

Two straight parallel arms 41^a, 41^b have their narrowed ends 42 pivotally secured to the lower ends of shafts 33 by pins 43. The arms are pivotable in spaced parallel vertical planes. Two axially aligned trunnion pins 44^a, 44^b are provided near the outer ends of arms 41^a, 41^b. Pivotally mounted on these trunnion pins is a rectangular frame 45 having an outer side rail 52, inner rail 54, front rail 56 and rear rail 58. The arms have upwardly extending fingers 49 at their outer ends. Each finger has a hole 50 through which a pin 51 can be removably inserted. The pins 51 engage in any one of a plurality of holes 53 formed in semicircular disks 57 secured to the upper edges of rails 56, 58. The trunnion pins have threaded outer ends on which are removable nuts 59 for demounting and remounting the frame on the arms 41^a, 41^b.

A shaft 60 secured by nuts 60^a, 60^b is supported by rails 54, 56. On this shaft are rotatable wheels 61 having pneumatic tires 62 closely spaced together. The planes of the tires are parallel to rails 54, 56. An inverted U-shaped bracket 63 is secured to the arms 41^a, 41^b near their outer ends. The bracket has arms 64, 65 braced by triangular plates 66. The bight of the bracket is a bar 67 secured to upper ends of the arms 64, 65. Centrally mounted on bar 67 are two spaced bracket plates 68 secured by a pin 69 non-rotatably to the lower and outer end of a plunger shaft 70. The plunger shaft moves axially in a hydraulic cylinder 72 filled with fluid 74 such as oil; see FIG. 6. On the inner end of shaft 70 is a piston 75. Two flexible fluid conducting lines 76, 77 are connected to fittings 78, 79 at opposite ends of the cylinder. The lines are connected to pump 38 mounted on top of the roller body. Valve 82 on the pump can be operated to pass fluid into either line 76 or 77 to retract or extend the plunger shaft. Under control of valve 82, when the fluid enters the upper end of cylinder 72 through line 76 it leaves the cylinder through line 77 and vice versa. The piston 75 separates the fluid in the lower end of the cylinder from fluid in the upper end. The cylinders 32^a and 32^b are similar in construction and operation to cylinder 72.

The upper end of cylinder 72 is pivotally secured by pins 73 to bracket arms 84 on the side 12^a of the roller body. The cylinder is pivotable in a vertical plane during operation of the attachment.

On the rear rail 58 of frame 45 are secured two depending posts or rods 85, 86. These posts have vertically spaced holes 87. Two sleeves 88 slidably engage on the posts and can be secured in desired vertical elevation by bolts 89 passing through registering holes in the sleeves and posts and engaged by nuts 90. The sleeves carry a curved blade 92 having its convex side facing

forwardly and its concave side facing rearwardly of the frame and roller. This blade has a hardened lower edge 93 which can serve to scrape and plane the ground rolled by tires 62.

In operation of the attachment, the tires 62 will roll over shoulder S inclined to the substantially horizontal road R is indicated in FIG. 1. The frame 45 tilts on trunnion pins 44a, 44b so that the tires 62 all make contact with the shoulder. The blade scrapes the ground passed over by the tires as the roller is drawn forwardly or moves forwardly under its own power. If desired, the blade 92 can be removed by disengaging bolts 89 and nuts 90. The outer ends of arms 41a, 41b can be elevated to elevate the frame 45 by retracting plunger shaft 70. If desired, bracket arms 63 can be rendered pivotable by pivotally engaging the ends of bar 67 to the bracket arms 64, 65 but some other direct connection will of course then be required between the attachment and the roller frame to prevent the attachment from pulling away from the roller frame when the attachment is operating on a sloping shoulder. The cylinder 72 will move in a vertical plane as the tires 62 roll over irregularities in the shoulder S. The arms 41a, 41b pivot on pins 43 at the lower ends of shafts 33. These shafts can be retracted or extended to elevate or lower the inner pivot points of the arms, by actuating the valves 39a, 39b. When the valves 39a, 39b and 82 are turned off, fluid is held in the cylinders and cannot flow out to the pump or inwardly from the pump so that the pistons are locked in position in the cylinders

FIG. 7 shows an arm 41, two of which can be used to replace arms 41a, 41b. Arm 41 is of longitudinally telescopic construction with a cylinder 100 having an axially extending plunger shaft 102. Narrow apertured end 104 of the cylinder will be engaged with the lower end of a shaft 33. Pin 46a or 46b will pass through hole 105 in shaft 102. On the outer end of shaft 102 is a finger 49a having a hole 50a to receive pin 51. Bracket arm 64a is attached to the shaft 102 and is reinforced by brace plate 66a. The cylinder has fittings 106, 108 to which flexible fluid conducting conduits or lines 110, 112 are attached. The shaft has a piston on its inner end inside the cylinder in the same manner as shown of cylinder 72 in FIG. 6. The lines 110, 112 will be connected to the pump 38 which will be provided with a two-way check valve like valves 39a, 39b and 82.

The operator of the roller can extend or retract shaft 102 to position the frame 45 and wheels 61 any desired lateral distance from the roller body, by operation of the valve controlling fluid passage to and from cylinder 100.

It will be noted that the innermost tire 62 is located close to the outermost tire 20, so that the shoulder and adjacent portion of the road can be rolled without leaving an unrolled gap between the road and shoulder.

The invention makes it possible for the pavement of both a road and shoulder of a highway to be compacted while it is being constructed and the pavement is still in plastic form. The angular position of the frame 45 can be fixed with respect to arms 41a, 41b by insertion of pins 51 through the fingers 49 or 49a and disks 57. If the pins 51 are removed, the frame 45 will pivot freely with respect to the arms. By insertion of the pins the tires 62 will roll the shoulder in a predetermined angular plane with respect to the plane of the road on which the tires 20 and 23 are rolled.

The attachment described can be installed on the sides of conventional road rollers of self-propelled or tractor drawn types. The invention makes it possible to roll a shoulder of a highway without danger of the roller turning over on steeply inclined shoulders and without loss of traction since all of the tires 20, 23 remain on the road while the shoulder is being rolled by tires 62.

It will be understood that the invention is also applicable to rollers with smooth cylindrical rollers or wheels at the front and rear thereof in place of pneumatic tired wheels.

While we have illustrated and described the preferred embodiments of our invention, it is to be understood that we do not limit ourselves to the precise constructions herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

Having thus described our invention, what we claim as new, and desire to secure by United States Letters Patent is:

1. A shoulder rolling attachment for a road roller, comprising a pair of parallel arms, hydraulically operated means connected to one end of each arm and attachable to a side of the roller for elevating the one end of each arm with respect to the roller, a rectangular frame having two opposing side rails and opposing front and rear rails, means pivotally engaging intermediate points of the front and rear rails to other ends of the arms respectively, an axle supported by the opposing side rails of the frame, a plurality of wheels for rolling the shoulder supported side-by-side on the axle within the frame, and other hydraulically operated means directly connected to the arms near the other ends thereof and attachable to the roller for elevating the frame and wheels with respect to the roller, said wheels having tires thereon for rolling the shoulder.

2. A shoulder rolling attachment for a road roller, comprising a pair of parallel arms, hydraulically operated means connected to one end of each arm and attachable to a side of the roller for elevating the one end of each arm with respect to the roller, a rectangular frame having two opposing side rails and opposing front and rear rails, means pivotally engaging intermediate points of the front and rear rails to other ends of the arms respectively, an axle supported by the opposing side rails of the frame, a plurality of wheels for rolling the shoulder supported side-by-side on the axle within the frame, and other hydraulically operated means directly connected to the arms near the other ends thereof and attachable to the roller for elevating the frame and wheels with respect to the roller, said wheels being shaped for rolling the shoulder, each of said arms including a cylinder having an axially movable plunger shaft at the other end of each arm for extending and retracting the frame and wheels laterally of the roller.

3. A shoulder rolling attachment for a road roller, comprising a pair of parallel arms, hydraulically operated means connected to one end of each arm and attachable to a side of the roller for elevating the one end of each arm with respect to the roller, a rectangular frame having two opposing side rails and opposing front and rear rails, means pivotally engaging intermediate points of the front and rear rails to other ends of the arms respectively, an axle supported by the opposing side rails of the frame, a plurality of wheels for rolling the shoulder supported side-by-side on the axle within the frame, other hydraulically operated means directly connected to the arms near the other ends thereof and attachable to the roller, for elevating the frame and wheels with respect to the roller, said wheels having tires thereon for rolling the shoulder, and a blade detachably secured to the frame at the rear rail for scraping the shoulder rolled by the tires.

4. A shoulder rolling attachment for a road roller, comprising a pair of parallel arms, hydraulically operated means connected to one end of each arm and attachable to a side of the roller for elevating the one end of each arm with respect to the roller, a rectangular frame having two opposing side rails and opposing front and rear rails, means pivotally engaging intermediate points of the front and rear rails to other ends of the arms respectively, an axle supported by the opposing side rails of the frame, a plurality of wheels for rolling the shoulder supported side-by-side on the axle within the frame, other hydraulically operated means directly connected to the arms near the

other ends thereof and attachable to the roller for elevating the frame and wheels with respect to the roller, said wheels having tires thereon for rolling the shoulder, each of said arms having an apertured finger at the other end thereof, each of the front and rear rails carrying a fixed member provided with a series of arcuately spaced holes, and removable pins engaging the fingers and fixed members to lock the frame in an angular position with respect to said arms.

5. A shoulder rolling attachment for a road roller, comprising a pair of parallel arms, hydraulically operated means for attaching one end of each arm to a side of the roller, a rectangular frame having two opposing side rails and opposing front and rear rails, said front and rear rails being pivotally supported on other ends of said arms, a plurality of wheels for rolling the shoulder supported side-by-side on an axle, said axle being supported on the opposing side rails, said wheels having tires thereon for rolling the shoulder, a U-shaped bracket carried by the parallel arms, and a hydraulically operated cylinder having a shaft directly connected to the bracket for raising and lowering the frame and wheels.

6. A shoulder rolling attachment for a road roller, comprising a pair of parallel arms, hydraulically operated means connected to one end of each arm and attachable to a side of the roller for elevating the one end of each arm with respect to the roller, a rectangular frame having two opposing side rails and opposing front and rear rails, means pivotally engaging intermediate points of the front and rear rails to other ends of the arms respectively, an axle supported by the opposing side rails of the frame, a plurality of wheels for rolling the shoulder supported side-by-side on the axle within the frame, said wheels having tires thereon for rolling the shoulder, a U-shaped bracket carried by the parallel arms, and other hydraulically operated means directly connected to the bracket for raising and lowering the frame and wheels.

7. A shoulder rolling attachment for a road roller, comprising a pair of parallel arms, hydraulically operated means connected to one end of each arm and attachable to a side of the roller for elevating the one end of each arm with respect to the roller, a rectangular frame having two opposing side rails and opposing front and rear rails, means pivotally engaging intermediate points of the front and rear rails to other ends of the arms respectively, an axle supported by the opposing side rails of the frame, a plurality of wheels for rolling the shoulder supported side-by-side on the axle within the frame, said wheels having tires thereon for rolling the shoulder, a U-shaped bracket carried by the parallel arms, other hydraulically operated means directly connected to the bracket for raising and lowering the frame and wheels, a pump, fluid conducting lines connected from said pump to the first-named and other hydraulically operated means, and valves in circuit with said lines to control flow of fluid therethrough to and from the pump and the hydraulically operated means.

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