Fig. 2.
TILE LAYING MACHINE

James C. Blackwell, Franklin, Ind., assignor to Bynco Corporation, Indianapolis, Ind., a corporation of Indiana

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SUMMARY OF THE INVENTION

One embodiment of this invention might include a tile laying machine capable of providing continuous protection from cave in danger comprising a central frame, a pair of opposing wheels attached to said central frame, said wheels and said central frame having a common axis, said wheels being adapted to rotate around the outer periphery of said central frame member, a chute for providing tile sections to the vicinity of the circumference of and between said wheel members, an arm attached to said central frame member which is adapted to grip said tile sections and position the same between said central wheels in abutting relationship with other tile sections, projections mounted on the inner periphery of said wheel, a ratchet attached to the upper extremity of said central frame member, said ratchet being adapted to engage said projections wherein actuation of the ratchet causes the wheels to rotate and thereby propel the machine members and thereby grip the tile laying sequence.

One object of this invention is to provide a tile laying machine.

Another object of this invention is to provide a tile laying machine which provides protection to the operator.

Related objects and advantages will appear as the description proceeds.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the machine of this invention;
FIG. 2 is a cut-away side view of the machine of this invention;
FIG. 3 is a top view of the machine of the subject invention;
FIG. 4 is a top view of the tile gripping means as used in the machine of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, it can be seen that the machine of this invention incorporates a large diameter wheel 2 which pivots around an axle 28 and is generally positioned around and outside of a central channel frame work 9. In operating relationship with wheel 2 is an expandable shield which is formed from sections 82 and 84. Likewise a top shield 96 is provided. The purpose of these shields is to protect the machine itself and its operator from environments. Likewise a chute 66 is provided which is generally adapted to transport drainage tiles 56 from the ground level to the bottom of trench 5. Even though the sections 82 and 84 and the chute 66 are expandable, they are, in operation, fixed in position relative to one another by suitable bolts or the like. The top shield 96 is fixed to the frame 9.

The wheel 2 is generally formed in two wheel sections, 2A and 2B which are positioned opposite each other on axle 28. Wheel sections 2A and 2B are generally formed from large diameter circular plates to which are attached rims 3 and 3A. Wheel sections 2A and 2B are attached to axle 28 by means of appropriate bearings not shown. In accordance with the preferred embodiment of this invention, circular wheel sections 2A and 2B are formed from cold rolled steel and rim portions 3 and 3A are welded to the periphery thereof. Positioned through rims 3 and 3A are a plurality of stud portions 34 which are generally adapted to engage the ground and give traction to the machine of this invention. Likewise, as will be described in detail hereafter stud portions 34 extend through rims 3 and 3A in such a fashion as to form an essential part of the ratchet drive mechanism of the machine of this invention.
Composite wheel member 2 of this invention is generally supported by central frame work 9 of which channel members 8, 14 and 16 are visible in FIG. 1. Arms 28 of central frame work 9 are a pair of opposing rollers 92 which are adapted to engage the inner periphery of rims 3 and 3A. Likewise, the extremities of central frame work are provided with opposing rollers 86 which are adapted to engage wheel sections 2A and 2B and provide support therefor.

Further illustrated in FIG. 1 is a hydraulic motor 38 and a pivot arm 36 which is attached to a pair of opposing ratchet arms 42 which in turn engage projections 34 (the inside ends of studs 34). By the operation of this ratchet assembly, wheel 2 is caused to rotate thereby propelling the machine of this invention in a transverse direction.

With reference to rims 3 and 3A it is to be noted that rims 3 and 3A are of such a width that projections 34 are positioned on the outer extremities thereof, while opposing rollers 92 engage the inner extremities of these rims.

Referring further to FIG. 2, it can be seen how the essential components of this invention cooperate with a conventional trenched 64. Trenched 64 is a conventional endless belt trenched. Due to the fact that the trenchers of this variety are commonly known in the prior art, this trencher is not described in detail. Power for trencher 64 and hydraulic power for the machine of this invention are provided by a central power source not illustrated. For example, a suitable power source might be a Caterpillar tractor to which it attached draw bar unit 71 and trencher 64.

As can be seen, the inner periphery of wheel 2 is generally supported by central frame 9. The central frame 9 is formed from a pair of opposing vertically disposed channel members 14 and 18, horizontal channel member 16 and four channels 6, 8, 10 and 12 which are positioned at approximately 90 degrees to each other around axle 28. It should be noted that while channels 8 and 10 are generally positioned at 90 degrees to each other, the angular relationship of channels 6 and 12 to each other and to channel 8 and 10 is not quite 90 degrees due to the fact that their disposition is somewhat controlled by the relationship of hydraulic motors 20 and 22 which are attached to channel members 6 and 12.

As can be seen, hydraulic motors 20 and 22 generally comprise a power arm which is adapted to engage tile section 56 by tile gripper 54 which generally circumscribe and engage tile 56. Hydraulic motors 20 and 22 are generally adapted to work in unison and pivot around points 98 and 100 to form arm 21, whereby they are attached to channel members 6 and 12. Power is supplied to hydraulic motors 20 and 22 and to tile gripper 54 by means of hydraulic lines 24, 26 and 52 which are in turn attached to a central control panel 32. Power is supplied to central control panel 32 via line 30 from an above the ground source, for example, a Caterpillar tractor unit which is not illustrated. Control panel 32 is positioned in a working relationship with seat 94 which is adapted to receive an operator.

In operation after laying tile 4, an operator positioned in seat 94 causes power arm 21 to engage a new tile 56 descending down chute 66 via gripping fingers 54. Hydraulic motors 20 and 22 are then operated in unison in such a fashion that tile 56 is removed from chute 66 and deposited into a working relationship with tile 4. When the abutting relationship is achieved, power operating arm 21 is caused to disengage tile 56 by the disengagement of tile gripper 54 and to return to a working position in the vicinity of chute 66 where it is positioned to engage the next tile proceeding down chute 66.

The movement of the machine in this invention in a transverse direction is generally accomplished by the rotation of wheel 2. Rotating power is supplied to wheel 2 by means of hydraulic motors 38 to which hydraulic power is supplied via line 50 from an above the ground source. Hydraulic motors 38 are attached to the upper extremity of pivot arm 36 which is in turn adapted to pivot around axis or point 44. Attached to pivot arm 36 is a ratchet arm 42 having a projection thereon which is adapted to engage projections 34. Ratchet arm 42 is biased into a working relationship with projections 34 by means of a compression spring 34 (not shown) which is positioned in a pivotally mounted housing 40. When hydraulic motor 38 is actuated in such a fashion as to draw pivot arm 36 in a clockwise direction ratchet arm 42 is likewise drawn towards hydraulic motors 38. Because of the working relationship of ratchet arm 42 with projections 34, wheel 2 is caused to rotate in a clockwise direction thereby propelling the machine of this invention in a transverse direction.

In accordance with the preferred embodiment of this invention, a pair of opposing ratchet arms 42 and spring biasing members 40 are provided to engage the projections 34 which are positioned on rims 3 and 3A. Both of these ratchet arms may be attached via pivot points 46 to respective hydraulic motors 38. Alternatively, in accordance with this invention, a single hydraulic motor 38 may be utilized.

Hydraulic motor 38 is illustrated in FIG. 2 as being operated via hydraulic line 50 from an above the ground source. In accordance with still another embodiment of this invention, hydraulic motor 38 is attached to control panel 32 in such a fashion that the operator sitting in seat 94 can also control the operation of hydraulic motor 38 and cause the rotation of wheel 2.

Draw bar assembly 71 as used in accordance with the machine of this invention generally incorporates a plurality of horizontally disposed channel members 72, 76 and 104. Horizontal segment 104 is attached to vertical channel member 18 of the central frame work. Horizontal channel members 72, 76 and 104 are attached to each other by vertical channel members 74 and 102 and by angularly disposed channel members 70 and 80. A hitch 78 is provided for on horizontal channel member 76 as a means of attaching draw bar assembly 71 to a central power source which may be, for example, a Caterpillar tractor. Draw bar section 71 of the machine of this invention is further supported by a pair of wheels 68. Wheels 68 are positioned on an axle 69 in such a fashion that they are beyond the extremities of trench 5.

The machine of this invention further incorporates an auger 60 which is adapted to smooth out and prepare trench 5 for the laying of tile 56 after trench 5 is dug by trencher 64. Auger 60 is powered by hydraulic motor 58 and is supported on a base 61 which is attached to a U-shaped structural arm 62. Structural arm 62 is attached to horizontal channel 72 and angular support member 70 of draw bar assembly 71. Hydraulic motor 65 is further attached to channel member 62 as a means of positioning and controlling the working relationship of auger 60 with trencher 64. Hydraulic power is supplied to hydraulic motor 58 by a hydraulic line not shown which is positioned on the inner periphery of structural member 62.

In FIG. 2 a single segment 56 of tile is shown in chute 66. In accordance with one embodiment of this invention, tile 56 may be fed into chute 66 manually. In accordance with still another embodiment of this invention, a magazine may be provided which will automatically position tile 56 in chute 66.

It can be seen that opposing sections 2A and 2B of wheel 2 and their corresponding rim sections 3 and 3A are supported by opposing rollers 86, 88, 90 and 92 which are positioned on the extremities of the above described central frame work. The bottom half of wheel 2 is generally supported by a pair of opposing rollers 86 and 88 which are attached to channel members 6 and 12. The axis of rollers 86 and 88 is at right angles to the axis axle 28. Accordingly, rollers 86 and 88 are adapted to
engage the outer extremities of plates 2A and 2B. Opposing pairs of rollers 90 and 92 are attached to channel members 8 and 10. The axis of rollers 90 and 92 is parallel with the axis of axle 28. Rollers 90 and 92 are adapted to engage rims 3 and 3A of wheel sections 2A and 2B. Rollers 86, 88, 90 and 92 generally cooperate in such a fashion as to render structural support to composite wheel 2.

Rollers which are parallel with the axis of axle 28 and rollers which are at right angles to axle 28 are illustrated. However, in accordance with another embodiment of this invention, rollers 86, 88, 90 and 92 can all be positioned in the same plane. That is depending on the structural requirements of wheel 2, all rollers which are parallel with the axis of axle 28 or all rollers which are at right angles to axle 28 may be utilized.

In accordance with this invention, wheel 2 and expandable shields 82 and 84 have sufficient structural integrity to protect an operator sitting in seat 94 in the event that the walls of trench 5 should tend to collapse. It should be noted that in accordance with this aspect of the invention, the operator of the machine of this invention is given continuous protection from cave in danger.

FIG. 3 is a top view of the machine of this invention with rims 3 and 3A cut away. Referring to FIG. 3, it can be seen in detail how rollers 86, 88, 90 and 92 provide support for circular sections 2A and 2B. Likewise, FIG. 3 in detail illustrates how a pair of opposing ratchet arms 42 are utilized to contact opposing projections 34 which are contained on rim sections 3 and 3A. FIG. 3 further illustrates the fact that rims 3 and 3A are relatively wide and that projections 34 are positioned on the outer extremities of these rims. Vertically disposed rollers 90 and 92 contact rims 3 and 3A in close relationship with the outer plates of wheel sections 2A and 2B. That is to say, rollers 90 and 92 generally contact rims 3 and 3A between the outer plates of wheel sections 2A and 2B and projections 34. Likewise, it is to be noted that rollers 86 and 88 contact wheel sections 2A and 2B on the inside of projections 34.

The top view of FIG. 3 further illustrates the working relationship of tile gripper 54 which is adapted to receive tile 56 in its power arm 21 as formed by hydraulic motors 20 and 22.

FIG. 4 illustrates the operation of tile gripper 54. It can be seen that tile gripper 54 is formed in two halves 54A and 54B which are pivotally mounted on pivot point 57. The movement of sections 54A and 54B with respect to each other is controlled by hydraulic motor 59 which is connected to section 54A by linkage 61. Power is supplied to hydraulic motor 59 via line 52. Tile gripper 54 is attached to power arm 21 via a knuckle 49 and a pin 53.

The invention claimed is:

1. A tile laying machine capable of providing continuous protection from cave in danger comprising a central frame, a pair of opposing wheels attached to said central frame, said wheels and said central frame having a common axis, said wheels being adapted to rotate around the outer periphery of said central frame member, a chute for providing tile sections to the vicinity of the circumference of and between said wheel members, an arm attached to said central frame member which is adapted to grip said tile sections and position the same between said central wheels in abutting relationship with other tile sections, projections mounted on the inner periphery of said wheel, a ratchet attached to the upper extremity of said central frame member, said ratchet being adapted to engage said projections wherein actuation of the ratchet causes the wheels to rotate and thereby propel the machine in a linear fashion along the ground.

2. The machine of claim 1 wherein said central frame contains a plurality of rollers which are adapted to engage the outer periphery of said opposing wheels.

3. The machine of claim 2 wherein each wheel is supported by a pair of opposing rollers having an axis which is parallel with the axis of said wheel and a pair of rollers having an axis which is at right angles to the axis of said wheel.

4. The apparatus of claim 1 wherein the tile gripping arms comprise a pair of angularly disposed hydraulic cylinders forming a power arm and further wherein said power arm is adapted to engage a tile section by means of a clamp comprising a pair of hydraulically actuated fingers which are adapted to engage the outer periphery of a tile section.

5. The machine of claim 1 wherein a seat is provided for an operator between said opposing wheels and a power console is provided wherein the operator can control the actuation of power arm and the ratchet propelling power system.

6. The machine of claim 5 wherein the ratchet propelling power system is controlled by the operator of a trencher which works in unison with said tile laying machine.

7. The machine of claim 5 wherein the projections which are contained on the inner periphery of said wheels project through to the outer periphery of said wheels and generally provide traction for said wheels.

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JACOB SHAPIRO, Primary Examiner

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