Sept. 29, 1931. E. KUERTS 1,825,320

BLOCK PAVING MACHINE AND THE LIKE

Filed Jan. 6, 1928

Fig. 1.

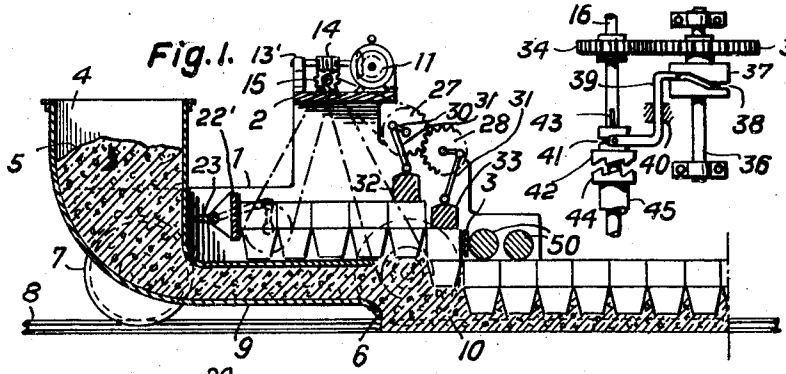


Fig. 3.

Fig. 2.

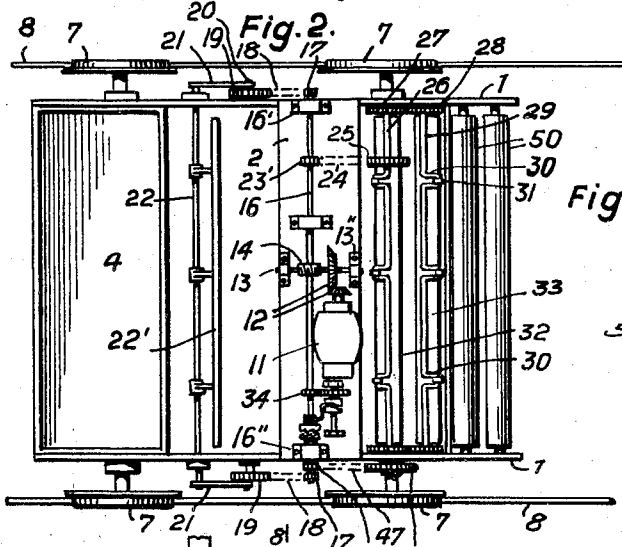


Fig. 4.

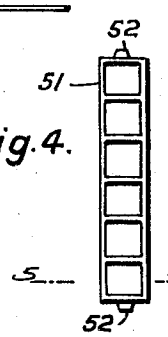


Fig. 6.



Fig. 5.

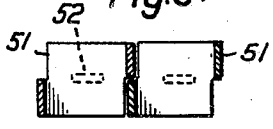


Fig. 7.

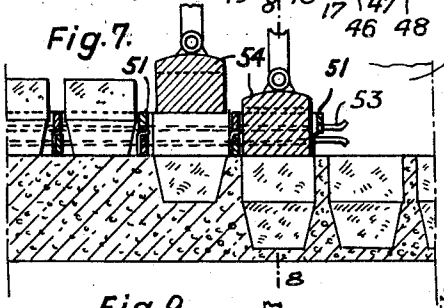


Fig. 8.

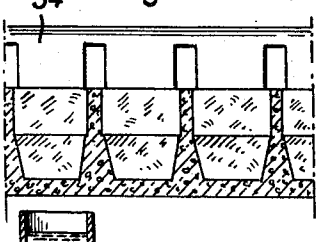
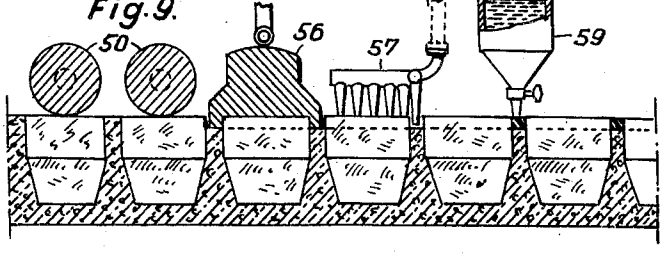


Fig. 9.



Inventor:

Ernst Kuerts

by C. F. Goepel

his Attorney.

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UNITED STATES PATENT OFFICE

ERNST KUERTS, OF STETTIN, GERMANY

BLOCK PAVING MACHINE AND THE LIKE

Application filed January 6, 1928, Serial No. 244,813, and in Germany May 27, 1927.

This invention relates to a paving machine of the kind provided with travel wheels and furnished with its own motive power whereby to move the machine forwardly for delivering and spreading a cementing medium, and to operate the mechanism and equipment for placing and pressing the paving units in place in the cementing medium.

An object of the invention is the provision of an improved machine of the kind referred to and in a manner as hereinafter set forth which will embody a forwardly positioned hopper for containing the cementing medium and an underslung extension leading from the hopper for delivering the cementing medium upon the roadway in the form of a prepared bed, into which the paving units are mechanically set and placed in rows to form a continuous pavement.

A further object of my invention is to provide a machine of comparatively simple and inexpensive construction, arranged to be driven forwardly by relatively short stages and to deliver the cementing medium upon the roadway simultaneously with the forward stages of movement.

Another object is to provide a machine in which the mechanism for pressing and setting the paving units is operated during the periods when the machine remains stationary. The machine also involves means whereby the paving units are arranged in rows in paving order upon the machine and held there in paving order during the forward stages of movement of the machine, the rows of paving units at the rear of the machine, from which the machine is withdrawn on its forward movement, being in the position to be pressed downwardly into the bed of cementing material.

Another object of my invention is to provide a machine of the character described in which all parts of the machine as well as the machine itself are operated from a power plant supported by the machine.

A still further object of my invention is to provide means whereby the paving units are loaded upon the machine in paving order ready for delivery in such order onto the bed of cementing medium upon the forward movement of the machine.

An additional object of the invention is to provide means whereby the rows of paving units may be laid with small interstices between them, and to provide means for pressing the cementing medium between the interstices and thereafter to fill the interstices in a suitable way.

With the foregoing and other objects in view, the invention consists in the improved paving machine, and in the form, construction and arrangement or arrangements of parts, as will be hereinafter more fully described and subsequently incorporated in the subjoined claims.

The invention will be best understood by referring to the accompanying drawings forming a material part of this specification and in which:—

Figure 1 is a diagrammatical side view of a machine made in accordance with the present invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is a plan view of a detail;

Fig. 4 is a plan view of a frame for receiving the paving units or blocks;

Fig. 5 is a transverse section taken on the line 5—5 of Fig. 4, with the frames lying in interengaged adjacency;

Fig. 6 shows a modified form of the frame designed for use in obtaining a pavement of blocks or stones staggered in corresponding relation to each other;

Fig. 7 shows on a larger scale a modified form of the machine with the kind of frames illustrated in Figs. 4 and 5;

Fig. 8 shows a transverse section taken on the line 8—8 of Fig. 7, the frames and operating means being united; and

Fig. 9 represents a longitudinal section, more or less diagrammatic in character, through the end of the machine and illustrating means whereby to fill in the interstices between the rows of paving units.

The machine comprises a frame composed of sides 1 connected by transversely extending beams 2 and 3. This framework, at its forward end, supports a hopper 4 for containing the cementing medium 5

to be delivered at 6 upon the surface of the roadway through an underslung extension or flat flue structure 9. According to an important feature of my invention, the top of the structure 9 serves as a support for the assembly of the paving units or stones to be placed and pressed into the bed 10.

The transverse beam 2 supports thereon an electric motor 11, the driving shaft of which operates a pair of engaged bevel wheels 12. It will be noted that the larger wheel 12, which is driven by the smaller one, is fixed to a shaft 13 carrying a worm wheel 14. In engagement with the worm wheel 14 is a worm wheel 15 which is fixed upon a transverse shaft 16. Said shafts 13 and 16 are supported, respectively, in suitable bearings as 13′, 13″ and 16′, 16″ on the transverse beam 2. At the ends of the shaft 16 are chain wheels 17 which are connected by chains 18 with the chain wheels 19 which are pivotally mounted in bearings in the sides 1. Projecting from the outer surfaces of the chain wheels 19 are pins 20. Links 21 are pivoted at one end to the pins 20 and at their other end to a transverse bar 22 arranged in longitudinal slots 23 in the sides 1.

Fixed to the bar 22 is a beam 22′ for engaging the paving units which may consist of blocks, stones or tiling. The bar 22 has a stroke greater than the thickness of the paving units. Said bar is constantly driven; but, as its stroke is greater than the thickness of the paving units, it always moves a short distance rearwardly before it makes contact with the paving units.

The shaft 16 is provided with a chain wheel 23′ which is connected through a chain 24 with a chain wheel 25 on a shaft 26, supported in bearings in the sides 1. Adjacent the sides 1, toothed wheels 27 are arranged on the shaft 26 and these are in engagement with other toothed wheel 28 arranged on a shaft 29 supported in bearings in the sides 1. Each of the shafts 26 and 29 is provided with crank arms 30 to which are pivoted connecting rods 31 which are journaled in suitable bearings in pressure beams 32 and 33. As shown in the drawings, the pressure beam 32 is located somewhat higher than the pressure beam 33, the difference between the levels of the said beams is about one-half the height of a paving unit. The stroke of each of the pressure beams is greater than half the height of a paving unit. Said pressure beams 32 and 33 are constantly driven, but since their full stroke is greater than half of the height of a paving unit, they make an idle movement for a short distance before abutting against the row of paving units.

In carrying out my invention the rear travel wheels 7 are periodically driven, the means for driving the same comprising the axle 16 to which is fixed a toothed wheel 34 having engagement with another toothed wheel 35 mounted on a short axle 36 which is suitably journaled in bearings in the beam 2. On the axle 36 is a disk 37 having an angular groove 38 into which extends the rectangularly bent end of a bar 39 having slidable movement in a guideway 40 provided in the beam 2. The other end of the bar 39 is similarly bent and carries a pin in engagement with the groove 41 of a clutch section 42 slidably mounted on a key 43 of the axle 16. Loosely mounted on the shaft 16 is a cooperating clutch section 44 formed with a cylindrical extension 45. The free end portion of the extension 45 extends through a bearing 16″ and carries a chain wheel 46. A chain 47 transmits driving power from the chain wheel 46 to a chain wheel 48 mounted on the shaft 49 which carries the rear travel wheels 7. By this arrangement, power may be taken from the motor for turning the rear travel wheels 7 and thereby advancing the machine, it only being necessary when it is desired to advance the machine, to throw the clutch into engagement in a manner that will be readily understood.

Two pressure cylinders 50 are supported upon the rear portion of the machine, the axles of the cylinders being mounted in suitable bearings in the sides 1. Assuming now that the motor is put in operation with all the parts of the machine in the position illustrated in Fig. 1, the pressure beams 32 and 33 will press the underneath rows of paving units downwardly into the bed 10. The row of units under the beam 33 is pressed all the way into the bed and to a position where it will be in proper symmetry with the units previously set, while the rows of units under the beam 32 is pressed only part way into the bed, that is to say, to a depth equalling about one-half the height of the units. While the paving units are being pressed into the bed and during the return movement of the beams upwardly to the positions shown in Fig. 1, the machine remains stationary. When the beams 32 and 33 have reached their elevated position, the clutch section 42 is moved into engagement with the section 44 so that the machine will be driven forwardly; and it is to be noted in this connection that the extent of the forward movement of the machine corresponds to the width of a row of paving units.

Simultaneously with the starting of the machine the beam 22′ engages and presses against the rows of paving units, holding them in place while the machine moves forwardly. With the forward movement of the machine, the extension 9 is withdrawn from underneath an additional row of paving units, the arrangement being such that after

each forward movement of the machine the paving units underneath the pressure beams 32 and 33 can be pressed downwardly into the bed 10, the paving units under the beam 33 being pressed all the way down as previously stated, while the units under the beam 32 are pressed only half way into the bed. After each forward movement of the machine, the beam 22′ travels back so that a new row of paving units can be inserted in place upon the underslung extension 9.

During each forward movement of the machine a proper quantity of the cementing medium is delivered and spread in the roadway so that a continuous bed as 10 is provided for the continuous setting in pavement order of the rows of paving units. The cementing medium may consist of any suitable watery mixture or strong mortar into which to press the paving units and which is adapted to harden for firmly consolidating the units in paving position. For instance, it may consist of a solution of cement and water, with or without the addition of sand or similar substance. The hopper 4 is kept substantially full of the cementing medium which naturally gravitates downwardly into and rearwardly through the underslung extension 9 to flow against the last row of fully set units as well as against the succeeding row of partially set units; and, as the machine is advanced a step, to flow below the next succeeding row of units as the rear end of the extension is withdrawn therefrom. If, owing to the character of the cementing medium or to any inclination of the roadway that causes the machine to tilt or incline forwardly, the cementing medium does not flow out of the extension with sufficient volume or rapidity, either the hopper or extension, or both, may be equipped with any well-known type of feeding screw for forcibly sluicing out and discharging the cementing medium. Such feeding screws may be conveniently operated by any suitable transmission connections driven from the shaft 16. From an inspection of Fig. 1, it will be understood that the pressure cylinders 50 operate to prevent any displacement of the previously laid rows of paving material during the compacting of the bed as a result of the penetration thereinto of the rows under the pressure beams 32 and 33.

In order to prevent the paving units from getting out of position before delivery to the bed 10, a frame 51 (Fig. 4) may be employed. This frame is provided with lugs 52 which operate in guides 53 arranged on the inner surfaces of the sides 1. The sides of two cooperating frames 51 may be alternately cut away as shown in Fig. 5 in order to have an interfitting engagement. By this arrangement small interstices between the rows of paving units may be obtained. In Fig. 7 I illustrate how these engaged frames 51 cooperate to produce interstices between the rows of paving units.

When it is desired to obtain a pavement in which the paving units are positioned in a staggered relation, a frame as 55 (Fig. 6) may be employed.

It is to be understood that when the machine is used without frames such as 51 and 55, there will be no interstices in the pavement.

In Fig. 9, I have shown diagrammatically another type of apparatus for producing the interstices. In this instance I employ an extra pressure beam 56, the lower surface of which corresponds to the form of the frames 51 or 55, as the case may be. The beam 56 may be operated in exactly the same manner as the beam 33 (Fig. 1), it being only necessary to add the necessary additional toothed wheels for engagement with the driving wheel 28, so that the beam 56 will be periodically lowered and lifted. As illustrated in Fig. 9, the beam 56 is designed so as to press down the cementing medium in the interstices. If desired, a blower 57 may be arranged to clean the interstices, and, after such cleaning, a supply receptacle 59 may be arranged to fill the interstices with cementing material suitable for the purpose.

From the foregoing, taken in connection with the accompanying drawings, it will be manifest that I have disclosed an extremely simple and practical paving machine and one which embodies the features of advantage enumerated in the statement of invention. While I have, in the present instance, shown and described the preferred embodiments of my invention, it is to be understood that the same are susceptible of modification in various particulars without departing from the spirit or scope of my invention or sacrificing any of its advantages.

I claim:

1. In a machine of the character described, consisting of a frame supported by axles with wheels, power means supported by the frame, means supported by the frame for transmitting power from the power means to certain of the axles whereby to advance the machine, a hopper disposed on the front of the frame to receive and hold cementing material and provided with an underslung extension extending toward the rear of the machine, said extension receiving the material from the hopper and affording a passage for the movement of the material to the rear of the machine for delivery upon the road way to provide a bed in the road way, the top of said extension affording a platform for the assembly thereon of rows of paving units in pavement order, and means for automatically maintaining the rows of paving units in pavement order

during relative advancement of the machine.

2. In a machine of the character described, consisting of a frame supported by axles with wheels, power means supported by the frame, means supported by the frame for transmitting power from the power means to certain of the axles whereby to advance the machine, a hopper disposed on the front of the frame to receive and hold cementing material and provided with an underslung extension extending toward the rear of the machine, said extension receiving the material from the hopper and affording a passage for the movement of the material to the rear of the machine for delivery upon the road way, the top of said extension affording a platform for the assembly thereon of rows of paving units in pavement order, means for automatically maintaining the rows of paving units in pavement order during relative advancement of the machine and as well during the consequent withdrawal of the extension from underneath the rear rows, said means including pressure beams acting upon said rear rows.

3. In a machine of the character described, consisting of a frame supported by axles with wheels, power means supported by the frame, means supported by the frame for transmitting power from the power means to certain of the axles whereby to advance the machine, a hopper disposed on the front of the frame to receive and hold cementing material and provided with an underslung extension extending toward the rear of the machine, said extension receiving the material from the hopper and affording a passage for the movement of the material to the rear of the machine for delivery upon the road way to provide a bed in the road way, the top of said extension affording a platform for the assembly thereon of rows of paving units in pavement order, a movable beam for maintaining the rows of paving units in pavement order during the advancement of the machine, to bring the rear rows upon the bed of cementing material consequent upon the withdrawal of the extension in accompaniment with the advancement of the machine.

4. In a machine of the character described, consisting of a frame supported by axles with wheels, power means supported by the frame, means supported by the frame for transmitting power from the power means to certain of the axles whereby to advance the machine, a hopper disposed on the front of the frame to receive and hold cementing material and provided with an underslung extension extending toward the rear of the machine, said extension receiving the material from the hopper and affording a passage for the movement of material to the rear of the machine for delivery upon the road way to provide a bed in the road way, the top of said extension affording a platform for the assembly thereon of rows of paving units in pavement order, a movable beam for maintaining the rows of paving units in pavement order during the advancement of the machine, to bring and release the rear rows upon the bed of cementing material consequent upon the withdrawal of the extension in accompaniment with the advancement of the machine, and means for pressing said released rear rows downwardly into the cementing material.

5. In a machine of the character described, consisting of a frame supported by axles with wheels, power means supported by the frame, means supported by the frame for transmitting power from the power means to certain of the axles whereby to advance the machine, a hopper disposed on the front of the frame to receive and hold cementing material, an extension leading from the hopper to the rear of the machine and forming a passage for the movement of the material from the hopper to the rear of the machine for delivery upon the road way to provide a bed in the road way, the top of said extension affording a platform for the assembly thereon of rows of paving units in pavement order, means for maintaining said units in pavement order during the advancement of the machine and to enable the rear units to be released so as to rest upon the bed, and mechanism arranged to be operated by the power means for pressing the released units into the bed.

6. In a machine of the character described, consisting of a wheeled frame adapted for advancing movement, a hopper on the forward part of the frame and adapted to receive and hold a cementing material, an extension extending from said hopper toward the rear of the machine and forming a passage for the movement of material from the hopper to the rear of the machine for delivery upon the road way to provide a bed in the road way, the top of said extension affording a platform for the assembly thereon of paving units in pavement order, means for maintaining the units in pavement order during the advancement of the machine, to enable the units at the rear of the extension to be released so as to rest in pavement order upon the bed, and the means whereby automatically to press the released units into the bed.

7. In a machine of the character described, consisting of a wheeled frame adapted for advancing movement, a hopper on the forward part of the frame and adapted to receive and hold cementing material, an extension extending from said hopper toward the rear of the machine and forming a passage for the movement of material from the hopper to the rear of the

machine for delivery upon the road way to provide a bed in the road way, the top of said extension affording a platform for the assembly thereon of paving units in pavement order, means for maintaining the units in pavement order during the advancement of the machine to enable the units at the rear of the extension to be released so as to rest in pavement order upon the bed, pressure means for pressing the released units into the bed, unit receiving frames associated with said pressure means, the latter being formed with notches which engage parts of the unit receiving frames when pressed downwardly, the said unit receiving frames being shaped so that the walls of the adjacent frames are in the same plane.

8. In a machine of the character described, consisting of a wheeled frame adapted for advancing movement, a hopper adapted to receive and hold a cementing medium, an extension for the hopper forming a passage for the movement of material to the rear of the machine for delivery upon the road way to provide a bed in the road way, the top of said extension affording a platform for the assembly thereon of paving units in pavement order, power actuated means to drive the machine forward, means for maintaining the units in pavement order during forward movement of the machine and to permit the units at the rear of the extension to be released to rest upon the bed, and means under the control of the power actuated means for pressing the released units downwardly into the bed.

9. In a machine of the character described, consisting of a wheeled frame adapted for advancing movement, a hopper on the forward part of the machine adapted to receive and hold cementing material, an extension for the hopper forming a passage for the movement of material to the rear of the machine for delivery upon the road way to provide a bed in the road way, the top of said extension affording a platform for the asasembly thereon of paving units in pavement order, power actuated means to drive the machine forward, means for maintaining the units in pavement order during forward movement of the machine and to permit the units at the rear of the extension to be released to rest upon the bed, means under the control of the power actuated means for pressing the released units downwardly into the bed, pressure cylinders for preventing the displacement of the units pressed into the bed, a vertically movable beam for forming grooves between the pressed units, and means for filling the grooves.

In testimony that I claim the foregoing as my invention, I have signed my name.

ERNST KUERTS.