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CONCRETE CHANNEL CUTTER AND DEPTH CONTROL THEREFOR

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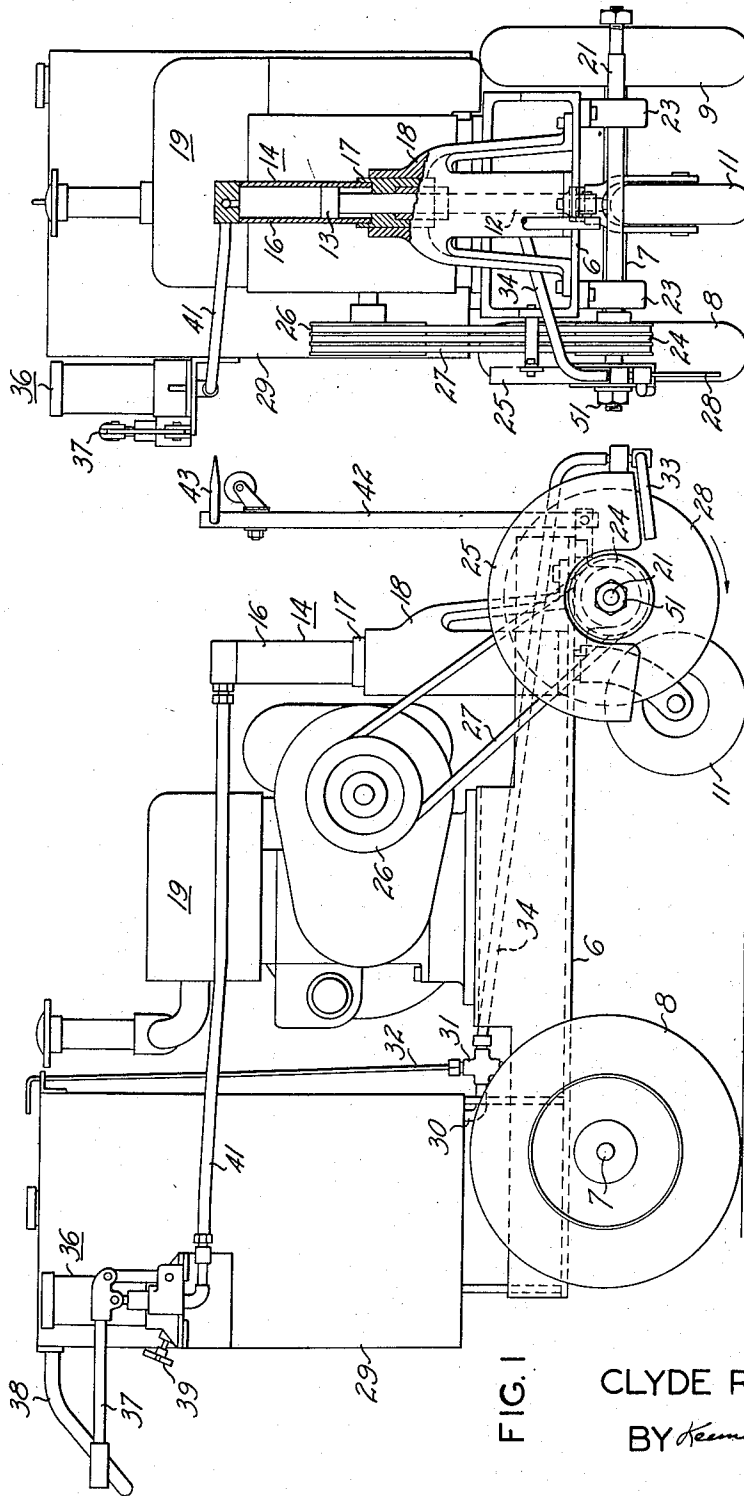


FIG. 1

FIG. 2

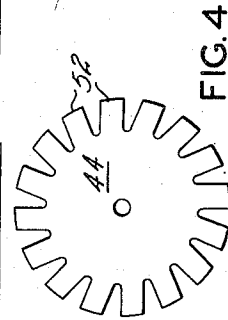


FIG. 4

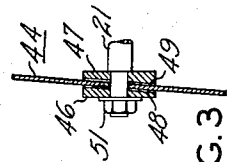


FIG. 3

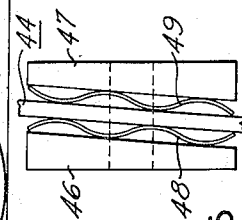


FIG. 5

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CONCRETE CHANNEL CUTTER AND DEPTH CONTROL THEREFOR

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3 Claims. (Cl. 262—20)

This invention is concerned with a machine for cutting concrete in constructing contraction joints in concrete.

An object of this invention is to provide a machine for cutting a narrow channel in concrete or like paving and in which the cutting element may be readily controlled for depth of cut by finger tip controls positioned adjacent to the operators' station.

A further object of this invention is to provide a concrete cutting machine which is easily maneuverable, economical to manufacture and use and of great efficiency.

A further object of this invention is to provide a concrete cutting machine which is readily steerable both while cutting and while being transported.

A further object of this invention is to provide a new and improved concrete cutting machine wherein the cutting member is always normally presented to the surface of the concrete being cut whereby the life of the cutting member is prolonged.

A further object of this invention is to provide a machine which will cut vertical channels of uniform width in concrete.

Another object of this invention is to provide a machine for cutting vertical channels in concrete wherein such machine is of great efficiency in that the cutting member used will continue to cut for a long length of time and wherein the concrete is cut with much greater speed than can be done with prior art machines.

Another object of this invention is to provide a concrete cutting machine capable of cutting smooth curves of a radius generally found in normal road construction.

Another object of this invention is to provide a machine which will remove the filling material from expansion and contraction joints in concrete paving.

These and other more detailed and specific objects will be disclosed in the course of the following specification, reference being had to the accompanying drawing, in which—

Fig. 1 is a side elevation of a cutting machine embodying the invention.

Fig. 2 is a front end view of the machine shown in Fig. 1 with some parts cut away for clarity of illustration.

Fig. 3 is a section view of a material removing blade which can be used in the machine shown in Fig. 1 when it is desired to remove material from contraction or expansion joints.

Fig. 4 is a side elevation of the blade shown in Fig. 3. Fig. 5 is an enlarged detail of Fig. 3.

Referring now more particularly to the drawing, the machine embodying this invention includes a base plate 6 which has attached thereto an axle structure 7 upon which semi-pneumatic wheels 8 and 9 are rotatably mounted. The forward end of the base plate is supported on a castoring wheel 11 which has a vertical spindle 12 pivotally attached thereto. The upper end of spindle 12 has a head member 13 attached thereto and forms the piston of a hydraulic ram 14. The cylinder 16 of the hydraulic ram is threadably engaged with a coupling member 17 carried by a housing member 18 attached to the front end of the base plate 6. An engine 19 is attached to base plate 6 as by bolting.

An arbor 21 is journaled in bearings 23 and 23 attached to the forward end of base plate 6. A multiple groove pulley 24 is attached to spindle 21 to revolve therewith. Pulley 24 is drivenly connected to multiple

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pulley 26 which is drivenly connected to motor 19 by means of multiple V-belt drives 27.

A cutting wheel 28 is removably attached to arbor 21. As indicated in the drawings wheel 28 is attached on the right hand end of spindle 21, but if desired wheel 28 can be attached to the left hand end; it being a mere matter of convenience as to which side of the machine the wheel is to be positioned on. The cutting wheel itself has diamond particles embedded in the periphery of the metal wheel and forms no part of this invention in itself as diamond cutting wheels are well known in the prior art. A removable metal guard 25 is attached to base plate 6. Metal guard 25 partly encircles cutting wheel 28 and can be removed for attachment to either side of base plate 6 depending on which side it is desired to position cutting wheel 28 on.

Attached to the rear end of base plate 6 is a water tank 29 which has an outlet pipe 30 connected to a valve 31 having a control rod 32 extending upwardly adjacent the top of the water tank. The outlet end of valve 31 is connected to a nozzle member 33 by means of a tube or hose 34. Nozzle member 33 is carried by blade guard 25 adjacent cutting wheel 28 in position to spray water on cutting wheel 28 during cutting operation of the machine. Nozzle member 33 remains attached to blade guard 25 and is shiftable therewith when the cutting wheel is moved to the opposite side.

A hydraulic pump 36 of conventional design is attached to the upper portion of water tank 29. Pump 36 is actuated by operating lever 37 which is positioned adjacent the hand rail 38 on the back end of the water tank. Pump 36 has a control valve (not shown) which is actuated by thumb screw 39 for releasing or holding the hydraulic pressure in line 41 which is connected to hydraulic ram 14.

On the front end of base plate 6 a guide indicator 42 is pivotally attached. As shown in Fig. 1, the guide indicator is shown in transport position. During cutting operation the guide member 42 is pivoted downwardly about its connection with base plate 6 until the pointer 43 contacts the surface to be cut. Then by keeping the pointer on the marked line to be cut in the concrete a straight cut is achieved.

The operation of the machine shown in Figs. 1 and 2 is as follows: Assuming that engine 19 is operating and cutting wheel 28 is revolving in the direction indicated in Fig. 1, then pointer 43 is moved until it contacts a line previously marked on the concrete. Tank 29 is filled with water and valve 31 is actuated by rod 32 to supply nozzle 33 with water to spray on cutting wheel 28 to thereby keep it cool. Thumb screw 39 is then actuated to relieve the hydraulic pressure in hydraulic ram 14 thereby permitting cylinder 16 to move downwardly relative to piston 13 and spindle 12 connected thereto, thereby bringing cutting wheel 28 in contact with the surface to be cut. When cutting wheel 28 has been lowered to its desired depth of cut, thumb screw 39 is again actuated to maintain the hydraulic pressure in ram 14 thereby maintaining cutting wheel 28 at a fixed height. The machine can then be pushed forward by the operator pushing on rail 38. The operator maintains the pointer 43 on the line to be cut and maintains enough pressure on the machine to keep the cutting wheel in operation. Ordinarily most cuts are straight cuts but with this machine a curved path may be readily followed as the operator can steer the machine with ease by applying pressure on the right or left hand side of the rail 38.

It should be here noted that all the controls for the machine are located handily near the operator's station so that the operator can control the entire operation of the machine from his ordinary position without halting operations. That is the operator pushes the machine and steers same by pushing on rail 38; he can reach across tank 29 to adjust the flow of water to nozzle 33; he can actuate pump 36 by manipulating lever 37 to raise cutting wheel 28; and he can manipulate screw 39 to lower cutting wheel 28.

Applicant has discovered that with his machine, contraction joints can readily be made in concrete construction merely by cutting the joints in after the concrete

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has undergone initial set. In the prior art, contraction joints were usually made by inserting metal or bituminous strips in the freshly poured concrete and then, if the strips are metal, removing them before the concrete had permanently set. This method of making contraction joints was laborious, costly and usually produced joints about which the concrete spalled and scaled. In applicant's method of construction contraction joints tests have indicated that a superior type of joint is produced which does not spall or scale and does not require any material such as tar or the like to be inserted after the joint has been cut. The reason for this is because the joint is so narrow that after it is cut, it soon fills up with dirt and the like so that there is very little room for water to enter to cause destructive action when freezing occurs.

Applicant has found that contraction joints or vertical planes of weakness can readily be cut in concrete by merely cutting a narrow vertical slot to a depth of approximately $\frac{1}{3}$ of the concrete slab thickness. Preferably the cutting should be done after initial set has taken place in the concrete but before permanent set, although cutting may be performed even after permanent set.

Referring to Figs. 3, 4 and 5 a cutting wheel 44 is shown that may be substituted for the diamond embedded cutting wheel 28 shown in Figs. 1 and 2. Cutting wheel 44 is obliquely mounted on spindle 21 in the manner of a swash plate by means of a pair of clamping members 46 and 47, a pair of springs 48 and 49 and a nut 51. The incline of the wheel in reference to a vertical longitudinal plane is such that when the wheel is revolved in an expansion joint the lateral throw of the wheel will not be greater than the width of the joint. By regulating the amount of compression on springs 48 and 49 by tightening or loosening nut 51 the amount of obliquity in wheel 44 may be regulated within limits, such that when a greater throw of wheel 44 is desired the compression on springs 48 and 49 is relieved and when the throw for which clamping members 46 and 47 were designed to provide in themselves is desired, nut 51 is securely tightened down thereby compressing springs 48 and 49 to the point that a substantially non-resilient mounting of wheel 44 is secured. Preferably the clamping members 46 and 47 should be designed to provide an oblique mounting of wheel 44 which is of less throw than the width of normal expansion joints, then nut 51 may be partly relieved permitting a resilient joint which will permit greater obliquity of wheel 44. As wheel 44 rotates the filling material in the expansion joint is cut out by teeth 52 in wheel 44 and thrown upwardly out of the joint, thereby preparing the joint for refilling with tar or like material commonly used for filling expansion joints. Wheel 44 is not capable of cutting concrete but is capable of cutting the types of material usually used in expansion or contraction joints and is capable of removing such material from the joint and slinging the material upwardly out of the joint.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims.

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It is claimed and desired to secure by Letters Patent:

1. A three wheel concrete cutting machine comprising a frame structure, an axle structure having wheels on both ends thereof and positioned in supporting relation to the rear end of said frame structure, a hydraulic ram attached to the forward portion of said frame structure, a caster wheel positioned forwardly of said wheels in a vertical plane including the longitudinal center line of said frame structure and in supporting relation thereto, said caster wheel including a vertical spindle therefor forming the piston in said hydraulic ram, a cooling medium supply tank positioned on said frame structure above said axle structure, a transversely extending arbor rotatably supported on said frame structure forwardly of said caster wheel, a cutting wheel attachable to either end of said arbor, means carried on said frame structure for rotating said cutting wheel, said last name means comprising a gasoline engine, and hydraulic control means positioned at the rear end of said frame structure and above said supply tank for controlling said hydraulic ram.

2. A cutting machine comprising a supporting frame, a hydraulic pump carried by said frame, a wheeled axle structure supportingly connected to the rear end of said frame, a hydraulic ram attached to a forward portion of said frame, a casting wheel including a vertical spindle therefor forming the piston in said hydraulic ram, means operatively connecting said ram and said pump, an arbor member mounted on said frame adjacent said caster wheel, a cutter member attached to said arbor for rotation therewith, and means for rotating said arbor member.

3. A cutting machine comprising a supporting frame, a hydraulic pump carried by said frame, a wheeled axle structure supportingly connected to the rear end of said frame, a hydraulic ram attached to a forward portion of said frame, a casting wheel including a vertical spindle therefor forming the piston in said hydraulic ram, means operatively connecting said ram and said pump, an arbor member mounted on said frame adjacent said caster wheel, a cutter member attached to said arbor for rotation therewith, said cutter member comprising a disc member obliquely mounted on said arbor and including spaced slots in the periphery thereof, and means for rotating said arbor member.

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