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MECHANICAL EDGING AND GROOVING TOOL

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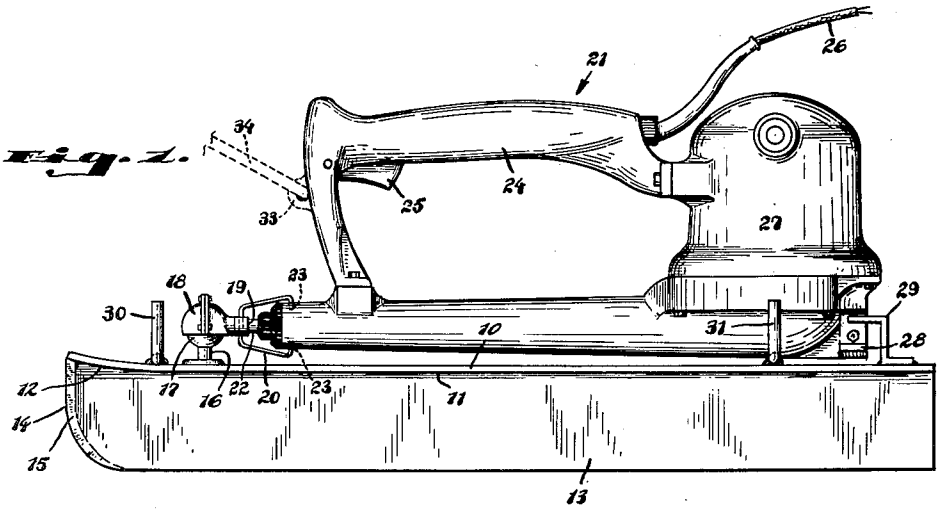


Fig. 1.

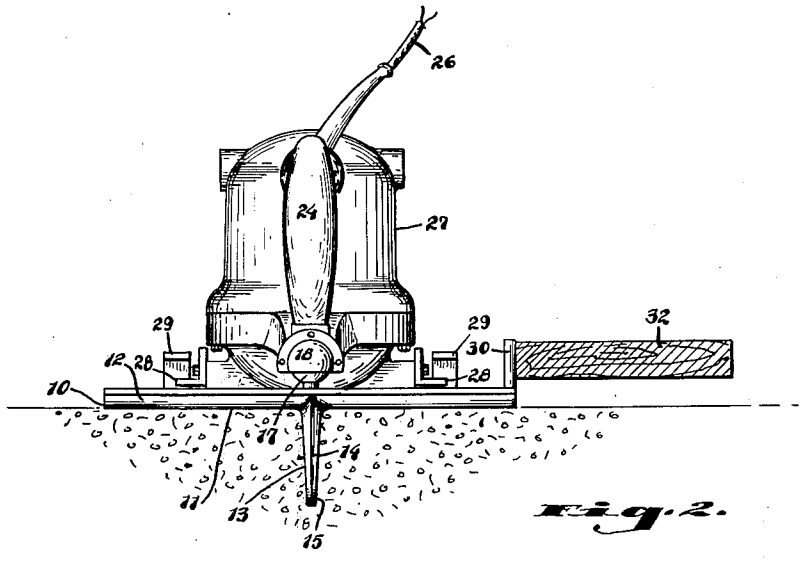


Fig. 2.

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MECHANICAL EDGING AND GROOVING TOOL

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8 Claims. (Cl. 94—45)

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The present invention relates to a tool for grooving and/or edging unset concrete. The primary object of the invention is to provide such a tool which will, under controlled conditions, force a plow through a mass of unset concrete to form a groove in the concrete, while simultaneously smoothing the corners at the mouth of the groove, and maintaining proper smoothness of the surface of the concrete adjacent the groove. A further object of the invention is to provide a device of the character described which will not produce, as a result of its operation, floatation or movement of water, through the body of the concrete, toward the surfaces of the groove. A still further object of the invention is to provide improved means for actuating such a tool, and to provide an improved connection between the power unit of the tool and the portion of the tool directly acting on the concrete. Further objects of the invention will appear as the description proceeds.

To the accomplishment of the above related objects, my invention may be embodied in the form illustrated in the accompanying drawings, attention being drawn to the fact, however, that the drawings are illustrative only, and that change may be made in the specific construction illustrated and described, so long as the scope of the appended claims is not violated.

Fig. 1 is a side elevation of a tool constructed in accordance with my invention; and

Fig. 2 is an end elevation thereof, shown in active relation to a mass of concrete shown in section.

Referring more particularly to the drawings, it will be seen that my tool comprises a body 10 which may be described as a continuous plate formed to provide a downwardly facing surface 11 of substantial length and width, which surface is plane except that it is curved gently upwardly within the region 12 adjacent its leading end. A blade or plow 13 is fixedly associated with the body 10, preferably lying substantially in the median longitudinal plane of said body and projecting downwardly from the surface 11. The leading end of the plow 13 is sharpened to an edge 14, and flares symmetrically, as at 15, from said edge into the major thickness of the blade.

Near its front end, and in the plane of the plow 13, the body 10 is provided with an upstanding

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post 16 which terminates in a part-spherical portion 17 which may be referred to as a ball. Embracing the ball 17 is a two-part socket 18, mounted to swivel universally on said ball. The rear portion of the socket 18 is formed to provide an anvil 19; and a spring clip 20, comprising two or more fingers and being substantially coaxial with the anvil 19, projects rearwardly beyond said anvil.

A power hammer 21, which may be of any known type, but which is illustrated in the present disclosure as an electric hammer, is suitably mounted upon the body 10 with its active nose 22 cooperatively engaging the anvil 19. In the illustrated embodiment of the invention, the extremities of the spring fingers 20 are turned inwardly to engage in notches 23 formed in the hammer housing. The hammer may preferably be provided with a carrying and guiding handle 24, and a trigger 25 controls a switch whereby power, led to the hammer through the lead 26, may be supplied, when desired, to the motor 27. Near its end remote from the nose 22, the hammer housing is provided with laterally-extending fingers 28 engageable beneath brackets 29 upstanding from the rearward portion of the body 10, said brackets and fingers cooperating to limit movement of the rear end of the hammer away from the body 10. Preferably, the brackets will be so located as to permit a slight lateral movement of the rear end of the hammer housing, as well as a slight movement thereof in a direction normal to the body 10.

Adjacent one lateral edge of the body, I prefer to provide two upstanding guide elements 30 and 31 arranged in a plane parallel with the plane occupied by the blade 13. Alternatively, a second pair of guide pins (not shown) may be provided adjacent the opposite lateral edge of the body 10; and more than two such guide pins may be provided for either or both lateral edges of the body 10. In use, the guide pins 30 and 31 may be caused to cooperate with the straight edge of a board 32, or similar guide element, supported above the body of concrete with which the tool is used in a predetermined relation thereto, whereby the tool will be guided to move rectilinearly.

It will be clear that the axis of the hammer 21 is disposed in the plane of the plow 13, so

that the impulses, delivered by the active nose 22 of the hammer against the anvil 19, will be directed accurately, in said plane, and in the direction in which the sharpened edge 14 of the blade faces. As is well understood in the art, the hammer 21 conventionally includes an element movable relative to the hammer body in the direction of length of said body to deliver successive, unidirectional power impulses in that direction.

In use, the sharpened end of the blade 13 is brought into engagement with a raw edge of a slab of unset concrete, with the surface 11 accurately positioned in the plane of the top surface of the slab. If, now, the motor 27 is energized, the hammer nose 22 will deliver to the anvil 19 a rapid series of relatively light blows or power impulses tending to move the tool accurately in the direction of the length of the blade 13 as it is pushed or pulled in the direction of travel. Thus, the plow will be caused to move through the mass of unset concrete, preferably being guided by the engagement of the guide pins 30 and 31 with the edge of a guide board 32, or the like, while the surface 11 of the body 10 floats on the concrete mass. The regions of juncture between the blade 13 and the surface 11 may be filleted as illustrated, if desired, to round the edges of the mouth of the groove being formed. The fact that the front end of the blade 13 is sharpened and that it flares symmetrically, facilitates, of course, movement of the blade through the mass of concrete within which are interspersed aggregate pieces of varying sizes. The sharpened blade tends to push aside such pieces of aggregate, rather than to force such pieces to move, along with the blade, through the mass of concrete.

As an alternative to the above-described manner of starting the groove, and where, as in most cases will be true, the edges of the slab are protected by forms, the groove will be started by pressing the blade 13 vertically downwardly into the mass of unset concrete, with the rear end of the blade in contact with the inwardly-facing surface of a form. After the surface 11 has been brought into floating engagement with the exposed surface of the concrete mass, the motor 27 will be energized to drive the tool through the concrete mass.

The upturned leading end of the body 10, of course, guards against diving of the tool. It may sometimes happen that the plow will tend to ride upwardly out of the mass of the concrete. When this occurs, the rear end of the hammer housing is lifted until the fingers 28 engage the brackets 29, thereby tilting the axis of the hammer slightly downwardly toward the leading end of the plow, whereby a downward component is imparted to the power impulses, and the surface 11 is moved back into floating engagement with the exposed concrete surface. In some cases it may be necessary to set the brackets 29 and the fingers 28 to provide a slight downward and/or a slight lateral component of the axis of the hammer at the leading end of the plow to keep the surface 11 in contact with the exposed concrete surface and/or the guide elements in contact with the straight edge of the board 32.

I have found that, if impulses having any substantial component in a direction transverse to the length of the plow are imparted to a tool of this character, the result is to cause movement of water through the concrete mass toward the bounding surfaces of the groove, to produce a badly "slumped" joint.

As thus far described, it is intended that the tool shall be manipulated by a worker kneeling on a bridge, or any suitable surface adjacent the line of the groove to be formed, and grasping the handle 24 directly. If desired, and under suitable circumstances, the handle 24 may be provided with a perforated ear 33, in the perforation of which may be engaged the hooked end of a pull rod 34 suitably proportioned to permit the worker to manipulate the tool from a standing position. As a further alternative, the ear 33 might be mounted upon the rear end of the hammer, so that the tool may be pushed by means of a rod engaged with said ear; or a cable might be attached to an ear such as 33 on the front end of the handle, whereby the tool could be guided and controlled in its movement through the unset concrete.

It will, of course, be obvious that the tool of the present disclosure is usable wherever it is desired to form a groove or slot in relatively plastic material. It will be most frequently used, of course, to produce contraction joint grooves in unset concrete, whether that concrete is laid to form sidewalks, roadways, floors, airport runways, or any other flat or inclined slab work.

I claim as my invention:

1. A grooving tool comprising means providing a surface to float on a mass of unset concrete, a plow supported by said means and projecting downwardly therefrom, and a power hammer having its power-delivery axis disposed in the plane of said plow and including an element movable relative to said means in the direction of length of said plow to deliver to said means a series of unidirectional power impulses in said direction, and means connecting said hammer to said first-named means, said connecting means comprising a swivel joint permitting movement of said hammer axis in said plane to vary the angular relation between said axis and said surface.

2. The device of claim 1 including cooperative means on said hammer and on said first-named means limiting the degree of movement of said axis away from parallelism with said surface.

3. The device of claim 1 in which said plow is sharpened to an edge at its leading end and flares symmetrically from said edge to the thickness of the body of said plow.

4. A grooving tool comprising a body presenting a substantially plane lower surface adapted to float on unset concrete or the like, a blade fixed to said body and projecting downwardly therefrom in substantially perpendicular relation to said surface, a post fixed to said body and projecting upwardly therefrom, a power hammer, and a ball-and-socket joint connecting the nose of said hammer with said post.

5. The device of claim 4 including bracket means upstanding from said body and engageable with said hammer, at a point remote from the nose thereof, to limit movement of said hammer away from said body.

6. The device of claim 4 including two guide elements carried by said body and upstanding therefrom at points differently spaced from an end of said body, the portions of said elements most remote from the plane of said blade lying in a common plane parallel with the plane of said blade.

7. The device of claim 4 in which said post terminates in a part-spherical portion and in-

cluding a cap element embracing said part-spherical post portion and carrying an anvil, and spring clip means coaxially associated with said anvil, projecting beyond the same, and engaging said hammer to secure the nose of said hammer in cooperative relation with said anvil.

8. The device of claim 4 including a handle for said hammer, said handle being fixed to said hammer, located thereabove, and disposed in a common plane with said plow.

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