March 1, 1938. F. P. SLOAN 2,109,933

MACHINE FOR SMOOTHING THE UNSET SURFACE OF CEMENT FLOORING

Original Filed Jan. 11, 1933

Fig. 1.

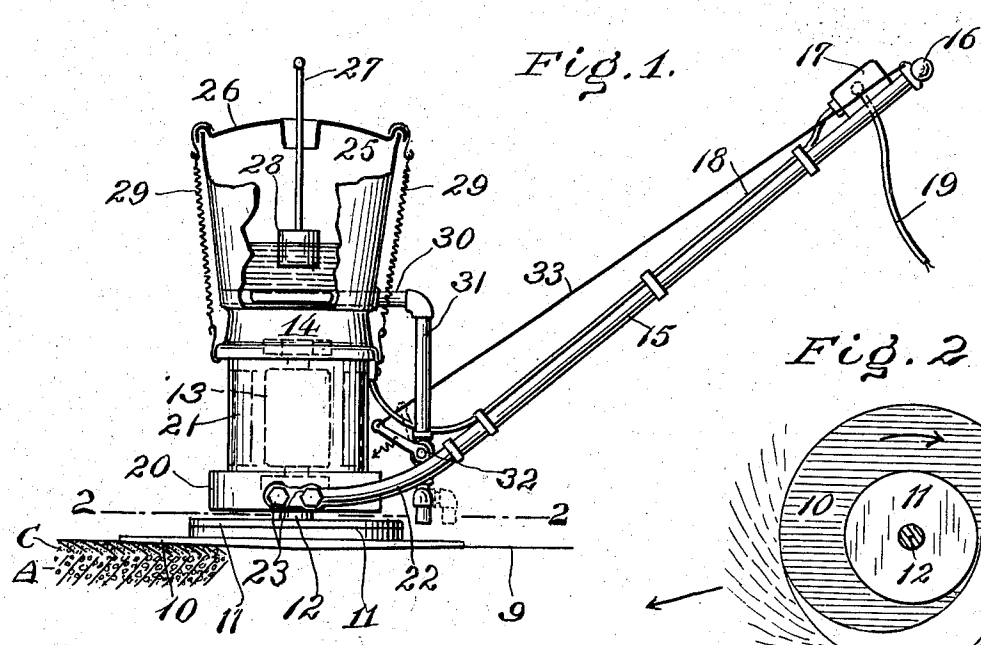


Fig. 2

Fig 4

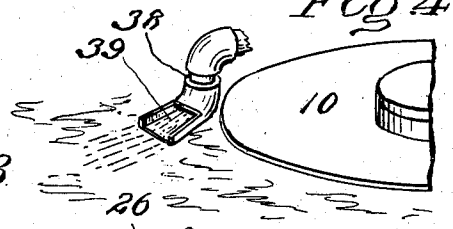


Fig. 3

Fig. 5.

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MACHINE FOR SMOOTHING THE UNSET SURFACE OF CEMENT FLOORING

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12 Claims. (Cl. 94—45)

This invention relates to machines for smoothing the unset surface of cement or analogous plastic flooring, namely, the class of machine known in the trade as a floating machine, used during the process of construction of concrete or other cement floorings. This class of machine is characterized by a disk-like smoothing or floating member which rests directly upon the flooring under construction, and is in fact the only part which rests upon the flooring, in contradistinction to machines, unavailable for this industrial purpose, comprising a wheeled vehicle carrying smoothing elements lowerable upon and liftable from the surface to be treated; the smoothing disk or member hereof supporting the frame of the machine during operation or rotation, so that the entire weight of the apparatus, including usually the operating motor, thus being applied to the smoothing member and through it to the surface under treatment.

This application is a division of prior application Serial No. 651,169, filed January 11, 1933 for Cement flooring construction method and apparatus, which may be referred to for typical modes of use of the invention hereof, the invention being available especially, but not exclusively, for the smoothing of the topping or finishing layer laid over a rough concrete base or arch or other suitable support.

The general object of the present invention, as in the parent application, is to facilitate the construction of a flooring of high quality and endurance and superior smoothness and hardness of surface.

A particular object is to render it practically possible and feasible to effect simultaneously, in the same operation or step, both the floating or smoothing of the surface and a supplemental or selective wetting of the surface, in an intelligent and readily controllable manner, affording the mason the ready means of regulation and determination of the final degree of wetness or distribution of moisture for the optimum finishing of the surface and of each section or area thereof, and the quality of the final product.

Further objects and advantages of the invention will be explained in the hereinafter following description of an illustrative embodiment thereof or will be understood to those conversant with the subject.

In the accompanying drawing Figure 1 is a side elevation of a cement floor smoothing or floating and wetting machine embodying the principles of the present invention.

Fig. 2 is a top plan view of the lower or disk portion of the machine taken partly in section on the line 2—2 of Fig. 1.

Fig. 3 is a general perspective view of a similar machine in actual operation upon a floor, and illustrating certain modifications of structure.

Fig. 4 is a perspective view of a detail modification.

Fig. 5 is a perspective of a further modification.

In the drawing similar reference characters refer to corresponding parts, and in general these correspond with the reference characters contained in said parent application, so far as the latter go.

The illustrated machine may be generally described as comprising the movable or actuable smoothing member or disk resting upon the unset or soft surface of the floor and carrying the weight of the machine, with a frame supported upon the disk, and the frame carrying means preferably an electric motor, for driving or actuating the disk (although power might in some cases be transmitted through a flexible shaft) and an upwardly extended or inclined stem or handle for manipulating the entirety; together with a liquid supply or vessel carried by the machine, as on the frame, for containing liquid or water, and having a discharge outlet or pipe arranged for delivery upon or adjacent to the driven member or disk, along with a discharge regulator, as a valve, for the water discharge, and connections to a suitable controller accessible at the handle for adjusting the regulator at will, during operations, to regulate the delivery of liquid or water, as to times or rates of delivery. By soft or unset is implied that the flooring during smoothing is susceptible to injury or disarrangement, as by substantial impacts upon it of liquid drops, this referring to the skin mortar or wetted surface; and, as will be explained, by this invention the water is applied or distributed thinly without substantial fall or impact, namely, in a substantially horizontal direction, that is, at a low or flat angle.

The floating or surfacing means may be of any usual or desired type, such as a well known marketed electric floating machine, comprising a circular disk 10 slightly convex underneath and adapted to rest and rotate directly upon the flooring to be treated. The disk being relatively thin is attached to a thicker portion or body 11 of smaller diameter, and these combined elements are attached to the lower end of a vertical shaft 12 extended downwardly from a driving motor 13. The motor is indicated in dotted lines within its housing or casing 21, and the

motor thus both is supported by and operates to drive the disk. The body 11 may consist of lower and upper portions as indicated, the lower being part of the disk and the upper rigid with the shaft, the two disconnectable for removing or replacing the disk. The motor shaft 12 need not be that of the motor armature as reduction gearing will usually be interposed. The motor casing is shown provided with an attached cover 14 having its lower end outstanding as a flange.

For the purpose of the manual shifting or guiding of the apparatus, and at the same time preventing rotation of the motor casing, a long stem or rod 15 is shown yoked at its lower end and connected to the opposite sides of the lower part of the casing, this stem extending at an outward-upward incline and at its high end having a cross bar or handle 16. Near the handle is mounted a switch box or electric controller 17 connected by a cable 18 to the motor and having a lead cable 19 for connection with a suitable source of current.

The present invention comprises a combined smoothing and wetting apparatus, and the conventional floating machine is herein modified by combining with its described elements, in any suitable manner, a water containing vessel 25, carried by the machine, and conveniently shown as of bucket shape and mounted directly on top of the motor, thus occupying but little space and providing ample head for the downflow of water; although other water supply means would serve.

The vessel 25 is shown specifically as having a cover 26 centrally apertured to receive the stem 27 of a gage float 28, the gage thus visually indicating the depth of water in the vessel. A depending flange prevents splashing. The bucket and cover are shown as held firmly but removably on top of the motor by a number of hook-spring devices 29, for example four of them, each comprising a strong tension spring secured to the vessel, as by a hook overlying the top of the vessel or its cover, and having a lower coupling or hook engaging under the flange of the motor cover, or otherwise attachable to the machine frame. Naturally the springs may be permanently fixed either to the vessel or to the frame, and detachable from the other. The vessel may readily be filled, as through the central opening of its cover; and it may readily be removed as described for ordinary uses of the floating machine.

For the purposes of delivering water from the vessel there is shown an interior perforated horizontal pipe 30 extending through from side to side and rigidly secured to the sides of the vessel. The exterior end of pipe 30 is connected to a peripheral downtake 31 which has its lower end arranged for delivery upon or adjacent to the surfacing implement, preferably directly upon the top side of the rotary disk 10, although in some cases it might deliver or spray somewhat beyond the disk periphery.

Regulation of the times and rate of water delivery is essential, and a spring-closed regulating valve 32 is shown interposed in the pipe 31. Said valve has its valve opening handle connected by a flexible connection, as a cord 33, with the cross bar 16 or other accessible point at the handle of the machine. The valve is shown as closed by its spring, and it may be opened more or less during smoothing operations by merely deflecting the upper end of the cord, manually, in any direction, to afford a high or slow rate of delivery of liquid or water upon the instrument or disk 10 or flooring. The upper part of the cord constitutes the controller for the valve or regulator and may be operated at will, frequently or seldom, as required. The wetted disk being rotary discharges centrifugally, as indicated, around part of its periphery, thus wetting the flooring, for example at the left or right hand side of the machine, or other point, depending on the place of delivery and direction of rotation, as the machine is shifted about, under full control and guidance of the operator.

In Fig. 1 is indicated the floor line or top level 9, and therebelow a portion of a cement or concrete topping or finishing layer C which has been laid upon a rough concrete base or arch A.

The disk portion 10—11 of the machine gives support to the frame and thereby to all other recited parts. The frame may be considered as comprising the base portion 20, usually containing reducing gearing, and the casing 21 of the motor, the motor being shown within said casing above its shaft 12, and the motor being thus in effect stood vertically upon its own shaft, through suitable thrust bearings, and thereby, with the frame 20—21, supported upon the smoothing disk 10—11.

The long upslanting stem 15, as stated, is formed into a fork 22 at its lower end, the fork straddling the base portion 20 of the frame and being attached thereto by bolts 23 or the like at each side, which may be arranged preferably for a rigid but possibly for a swingable mounting of the stem 15, the usual rigid connection permitting more complete manipulation of the machine, namely by causing tilting pressure of the disk on the floor in any direction and so utilizing the power rotation of the disk to steer or promote travel at will in any desired direction and manner over the floor, including repetition or return over any surface portion after wetting thereof.

Fig. 2 indicates in a general and diagrammatic way the flow of the water deposited by pipe 31 on disk 10. The water spreads as a thin sheet on the disk and is carried around in the same direction as the disk rotation, drifting outward by centrifugal force, and being then thrown off and distributed smoothly along an extended arc of circumference directly upon the flooring surface to be wetted and floated.

In the embodiment shown in Fig. 3 are variations both of construction and design, and this figure additionally indicates the usual manner of movement or shifting of the machine, namely, in sweeping or circling curves upon the floor, this being done under the observation and skill of the mason handling the machine, the arrow showing the general direction of shift, and an indication or wake appearing along the path already travelled. The mason also observes the resulting character of the surface, which may noticeably vary under adequacy or various degrees of deficiency of moisture. By manipulating the controller or cord 33 the mason has thereby the means of combining the smoothing or floating action with a supplemental or selective wetting so as to secure the optimum degree of wetness at every point of the finished flooring; unusually dry spots or areas receiving the most added water; while areas that are seen to be quite wet, due for example to surplus water upon the arch beneath, receiving no further water,

Fig. 3 shows certain modifications of structure. Whereas in the embodiment of Fig. 1 the mason may operate the controlling cord **33** selectively to open the valve to varying degrees, and thus determine the rate of water discharge, in Fig. 3 there is shown, in the discharge pipe **31a**, a special setting valve **35** with a hexagon adjusting stem **36**, so that the maximum water flow may be initially restricted to a safe rate, thus permitting the mason to operate the regulating valve **32** by the cord **33** between full open and full closed positions, intermittently and selectively, thus relieving him of the attempt to adjust the degree of opening of the valve. By this feature a foreman may guard against the danger of the masons using an excess amount of water when standard large capacity valves and piping are used, although a metering orifice in the supply may be used for this purpose. To avoid damage to the valve seats and washers by grit or other solids, a screen or separator may of course be introduced, for example, near the vessel inlet or outlet, or in the passage between the vessel and valve.

Another modification illustrated in Fig. 3 is the arrangement of the delivery pipe so that its delivery may be directed in different ways. Thus a swivel fitting **37** is shown, below which is the swingable pipe end or outlet **38**. This is shown in full lines in position corresponding with Figs. 1 and 2, wherein the water is delivered near the body **11** of the disk **10**, thereby acquiring considerable centrifugal force, and also delaying somewhat the point of offthrow of water from the disk to the flooring. By setting the outlet pipe **38** at its furthest out position, indicated in dotted lines, the water is discharged directly upon the flooring beyond or adjacent to the disk, rather than on the disk, in which case the pipe end may have a perforated or other spray device of any desired construction, directable as desired. At the intermediate position of the outlet pipe shown in Fig. 3 the water is delivered quite close to the margin of the disk, which will cause its application to the floor at an earlier point and with less centrifugal force. The disk top may be grooved or corrugated to direct specially the distribution. These various modifications give greater latitude and flexibility of operation.

The apparatus described may be employed for auxiliary purposes in the construction of flooring, as, by the inclusion in the water of suitable agents, for the hardening of the surface, its coloring, or other treatment; the agents thus being spread and distributed as required. Cement may be added to the water, constituting a grout, to be used in going over the floor to correct accidental conditions, or areas of excess dryness, such application being combined with a moothing or refloating action. On cold days the water may be kept hot, as by an electric heating unit, to accelerate setting. Other applications suggest themselves.

This invention permits one mason, rather than two men, to attend both to the floating and the wetting, thus saving labor; but more importantly, it places in the control and responsibility of a single operator both the smoothing operation and the cooperative completing of the wetting of the topping, or rendering it uniformly wet. An unskilled water carrier may be employed to observe the gages and care for the refilling of the water vessels for a number of masons.

By altering the location of the delivery of water from the pipe **31** its discharge upon the flooring can be varied. As shown in Fig. 2 the travel of the machine may be in the direction of the arrow, and the water is thus applied ahead of the smoothing operation, when the valve is open. Thus the mason can wet a dry area as he enters it. Great latitude of action is possible. Any area can be wet and then immediately smoothed. Dryness can be judged visually by an experienced mason, and the feel of the surface constitutes a further test as the machine passes upon each area. The machine may be moved off a dry spot when found, water applied, and the machine immediately returned thereto. By a slight tilting of the disk the mason can guide and cause travel in any direction, right or left, to or from him. Fig. 3 roughly indicates one strip of area being floated after another; the previous strip may have felt somewhat dry and the water is seen being distributed thereon alongside the disk, in preparation for return and resmoothing thereof.

Some characteristic conditions in the practical use of this invention are the following. The unset cement concrete is of course soft and subject to injury, as by heavy drops showering vertically upon it, which would tend to penetrate, and disturb or segregate the mixture, lowering the fines and cement. This is herein avoided by a gentle application of water, without high vertical drop. A fine horizontal spray by a device **39**, as in Fig. 4, might do, converting the vertical drop into substantially horizontal application. But the use of the rotary disk has the advantage of power application, by centrifugal force, horizontally at a very low level. Individual drops may strike tangentially without impact and roll and spread themselves along the soft surface. This motion combined with the travel of the machine makes possible a thin and fairly uniform wetting, which is at once completely spread and distributed by the smoothing action of the disk.

The actual smoothing or floating of the soft concrete is a combination of the disk rubbing action, by both its rotation and advance, with its heavy flat pressure upon the surface. These actions, with complete control of wetness, permit the best possible results.

The water vessel has been specifically described as fixed atop the frame that carries the motor, but manifestly it may be otherwise disposed on the machine, as partly or wholly on the stem or handle; indeed by making the stem larger and hollow the water could be contained therein. The regulation of water outflow from the vessel is shown by valve, but as one of many obvious equivalents, the vessel might be pivoted or tiltable, and tipped to spill and discharge water as and when needed.

In a special sense the present invention may be said to comprise, in combination with power means for smoothing or floating the unset cement surface, of a cooperative means for discharging water upon the surface adjacent to the smoother in a substantially horizontal manner, that is at a flat or low angle of discharge. This has been indicated in Figs. 1 to 3, wherein the disk **10** is thin and its rim is flat or at a low angle so as centrifugally to discharge the water without vertical drop or impact upon the floor. The same principle is illustrated in Fig. 4 wherein the discharge is through a sprayer, placed low and directed horizontally for the desired flat angle of application. A similar operation may obviously otherwise be obtained.

The rotary disk discharge of water has the

advantage of utilizing the power of the machine, and in this aspect the disk, as a discharge means, is of advantage whether or not it is the part actually contacting and smoothing the floor. Thus in Fig. 5 the disk 10 is shown replaced by a special construction wherein a number of small smoothers or disks 10a are mounted, preferably rotatably, at the underside of an overlying disk 10b, mounted underneath a body 11a. The delivery pipe 31 delivers on the large disk 10b, which latter therefore is representative of any rotary disk furnished upon a smoothing machine to receive at a low level and centrifugally distribute water to the floor under treatment.

There has thus been described a shiftable power-driven cement-floor floating and wetting apparatus, characterized, according to this invention, in that the driven floating member which presses upon the floor has combined with it means for distributing water or other liquids selectively adjacent to the floating member and at a flat or low angle as described; preferably such distributing means comprising a rotary disk which receives the supplied water and centrifugally discharges it at such flat angle upon the flooring.

I claim:

1. An apparatus or machine for use in the treating of cement or other flooring comprising a rotary surfacing member or disk resting upon the floor, with a frame supported thereon, a motor for driving the member and a handle for manipulating the entirety; together with a vessel carried on the frame for containing liquid and having a discharge outlet arranged for delivery upon the rotary surfacing member, whereby the liquid is distributed by centrifugal force, and means accessible at said handle for regulating the delivery of liquid.

2. An apparatus as in claim 1 and wherein the vessel is readily attachable to and detachable from the frame.

3. A machine for smoothing the unset surface of cement flooring consisting of a frame, an electric motor housed therein, a vertical shaft below and driven by the motor, and supporting the motor and frame, a rotary horizontal smoothing disk mounted upon the lower end of the shaft, to rest directly upon the flooring and sustain the weight of the motor and frame, a handle for shifting or guiding the machine over the flooring, a liquid containing vessel supported by the machine, an outlet from the vessel delivering to or near the disk, a regulating means for said delivery, and a controller at or near the handle for operating the regulating means; whereby the flooring may be selectively supplementally wetted under observation during smoothing to attain optimum condition for smoothing and setting of the cement surface.

4. A machine as in claim 3 and wherein the vessel is mounted on the frame vertically above the motor, and the outlet is a pipe descending peripherally adjacent the motor for discharge upon the disk.

5. A machine as in claim 3 and wherein the outlet is adjustable to discharge at different positions relatively to the disk.

6. A machine for smoothing or floating the soft unset surface of cement flooring comprising an electric motor, a vertical shaft below and driven by the motor, a thin horizontal smoothing disk mounted upon the lower end of the shaft, to rest directly upon the flooring and sustain the weight of the machine, thus applying heavy pressure during smoothing, means under manual control for shifting the machine over the flooring cooperatively with the rotation of said disk, a liquid containing vessel with an outlet delivering liquid upon the disk, to be thrown centrifugally outward for wetting the floor during operation, and a regulating means for said outlet operable at will during shifting movements, whereby the unset flooring may be selectively supplementally wetted under observation during smoothing to attain optimum condition for smoothing and setting of the cement surface.

7. In a shiftable power-driven combined floating and wetting apparatus for unset plastic or cement floors, the driven floating member pressing and movable upon the floor, in combination with a means for distributing water selectively adjacent to said member in view of the mason and at a flat angle, said means comprising the upper side of a rotary disk, adapted to receive the water and centrifugally discharge it at such flat angle, and means under ready control of the mason for selectively discharging water upon such disk.

8. A machine for use in constructing flooring from cement or like plastic material and adapted for distributing liquid thereover while unset, comprising a power-driven rotatable disk resting upon and movable selectively over the flooring surface under control of the mason, a liquid-containing vessel carried on the machine, with an outlet arranged to deliver upon the top surface of the disk, to be discharged therefrom centrifugally to the flooring, and means operable by the mason for controlling selectively the rate or time of liquid delivery from said outlet, simultaneously and in cooperation with the selective operating travel of the machine.

9. A machine for distributing liquid selectively over unset flooring comprising a power-driven rotatable disk adapted to be shifted selectively under mason control over the flooring surface, a liquid-supply carried on the machine with an outlet therefrom arranged to deliver upon the top surface of the disk, thereby to be discharged by centrifugal force from the disk to the adjacent flooring, and means for controlling selectively the delivery from said outlet to the disk readily accessible to and operable by the mason while controlling selectively the shifting of the machine.

10. A freely-steerable mason-controlled machine for smoothing or floating the unset top surface of cement mix flooring, comprising a single rotatable smoothing disk constituting the machine base resting directly on the floor, a frame supported wholly upon the disk, and with which the disk is rotatably connected, whereby during operation the entire weight of the frame is applied through the disk upon the floor surface, power means on the frame for continuously rotating the disk, and a handle comprising a projecting stem firmly attached to the frame and with an accessible handle piece arranged transverse to the effective length of the stem whereby a mason standing adjacently on the floor, by manipulating the handle, may cause tilting pressure of the disk on the floor in any direction, thereby to utilize the disk rotation to steer or promote travel of the machine at will in any desired direction and manner over the floor; together with a vessel carried on the machine for containing treating water or liquid to cooperate in the setting or smoothing of the floor surface and having an outlet with discharge so arranged that the liquid is delivered upon the floor surface to wet it adjacent to the disk, and a liquid dis-

charge opening and closing regulator with control means accessible at the handle for quick regulation thereof at will; whereby the mason has continuous complete control, under his observation of the floor surface and treatment thereof, both as to the selective travel of the disk over the floor and of the selective delivery of the treating liquid upon floor portions requiring wetting, thus affording ready cooperative wetting and smoothing functions by the same mason in the same stage of floor top surface treatment.

11. A machine as in claim 10 and wherein the liquid delivery is at a low angle upon the unset floor surface adjacently exterior to the disk and in view of the mason.

12. A machine as in claim 10 and wherein the discharge outlet discharges upon the upper surface of the disk whereby through centrifugal force the liquid delivery is at a low angle upon the unset floor surface adjacently exterior to the disk and in view of the mason.

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