Dec. 29, 1936. H. S. BOULTON 2,065,560

FLOOR MACHINE

Filed July 5, 1935

Fig. 1.

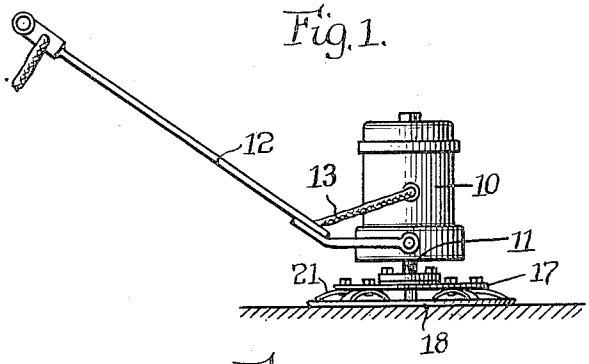



Fig. 2.

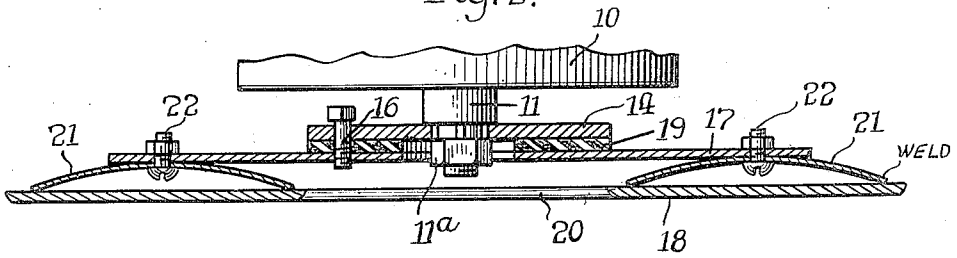



Fig. 3

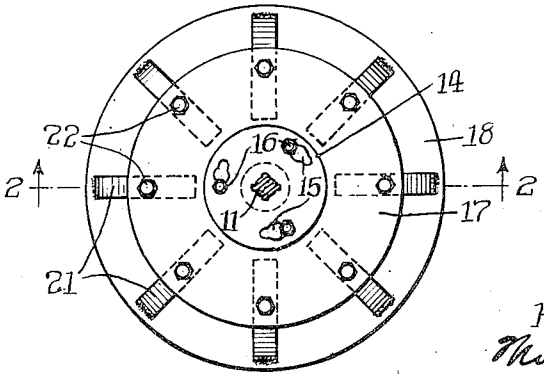
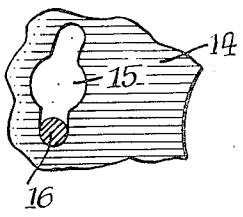



Fig. 4




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2,065,560

## FLOOR MACHINE

Harold S. Boulton, Chicago, Ill.

Application July 5, 1935, Serial No. 29,901

6 Claims. (Cl. 72—136)

My invention relates to floor surfacing machines and particularly to a machine adapted for use in troweling the surfaces of cementitious, plastic and similar materials.

It is customary to use a machine including a motor-driven disc for "floating" the surface of cementitious materials, the disc having a convex contacting surface. However, it has not been considered possible to trowel a surface by power means as distinguished from the slow and laborious process of hand troweling.

I have discovered that a much superior floor surface may be secured by the use of a motor driven, rotatable disc having a substantially planar contacting surface. I am able, by the use of such apparatus, to accurately trowel and finish a floor surface with a substantial saving in time and labor. Not only is the use of such a machine more economical than the hand method, but the results secured are measurably better, both in the degree of compactness secured and the more perfectly level character of the finished floor.

An important point in connection with the use of a machine such as herein described is in the character of the surface relative to the fine and coarse particles of the mixture. In the working of cement finish floor, there is a tendency to bring to the surface the fine particles of sand in the mix. Of course a certain small proportion of the fines in the surface is desirable in order to insure a smooth finish, but if more than the actual minimum required for that purpose are brought to the surface, it will wear easily and have a tendency to become dusty. If the fines in the surface are limited and the finish is level with the top points of the coarser sand particles, the wearing qualities of the floor will be much superior.

Hand troweling has the effect of bringing the fine aggregates to the surface, whereas operation by the rotary motion of the relatively heavy machine has the opposite tendency. This results in the production of a floor surface that is inherently superior so far as wearing qualities are concerned. As stated, this is believed to be brought about by the use of a machine in which the troweling action is effected by a rotating action, continuous in one direction, and adapted to be propelled over the surface in a plane. The reason for this unusual effect is not now thoroughly understood but undoubtedly has a relation to known physical laws. Of course, one reason for the absence of an excess of fines in the surface following the use of the machine is that the floor may, for machine troweling, be allowed to set to a greater extent before the troweling action is started than would be possible in the case of hand troweling. Furthermore, the floor may be finished more uniformly throughout a relatively large area because of the fact that troweling may be completed by the use of the machine in a much shorter time than in the case of hand troweling. Thus the mixture may be allowed to set to a more ideal point before starting the troweling action than in the case of hand troweling.

The best and most level surfaces are obtained where flat troweling is done; that is, where cocking of the trowel is avoided. However, this result is secured with difficulty even among skillful operators and an object of the invention is to provide means whereby a thoroughly compacted, evenly flat surface is assured that is not dependent on operation by a highly skilled mechanic. The construction of the machine is such that a thoroughly satisfactory surface is secured regardless of the previous skill and experience of the operator as a hand troweler.

One reason for the successful operation of the motor driven trowelling plate is that the weight, and consequently the pressure imposed on the cement surface is uniform and may be predetermined. It will be noted that the motor and its associated parts are superimposed on the plate and that the operating handle is so arranged that the operator can neither add to nor detract from the pressure. It may, furthermore, be found desirable to increase the pressure in later stages of the trowelling, by adding a weight to the structure.

It is essential in the operation of any trowelling device that the operating surface of the trowelling plate be maintained in the desired plane of the finished floor. This result is inherent in the structure proposed, for two reasons: First, because of the relatively large area and the suction developed between the plate and the floor, making it difficult for the operator to maintain the structure in other than a plane corresponding to the surface of the material, and; second, because of the gyroscopic action of the rapidly rotating plate, as the result of which it is extremely difficult to change the plane of rotation of the plate.

As an incident to the use of the described apparatus and in order to secure the best results, I provide resilient means in the connection between the motor and the plate or disc. This serves to avoid vibrations that would interfere with the most desirable operation. As a further advantage in operation, I provide means that will serve to reduce the vacuum created between the disc and the surface operated on.

The invention will be more readily understood by reference to the accompanying drawing in which,

Fig. 1 is an elevation of apparatus constructed in accordance with my invention;

Fig. 2 is an enlarged sectional view through the troweling disc;

Fig. 3 is a top plan view of the disc and its connecting plate; and

Fig. 4 is a detailed plan view showing the form of connection between the disc assembly and the driving head.

In the drawing I have illustrated the apparatus as including a housing 10 containing a motor, having a drive shaft 11. An operating handle 12 is connected to the housing and a cable 13 transmits electric power to the motor.

Connected to the shaft 11 by means of a nut 11a is a driving head 14 having a plurality of equally angularly spaced apertures 15 therein. One part of the aperture is of a size sufficient to admit the head of a connecting bolt 16 while the two ends of the aperture are of reduced size to conform substantially to the shank of said bolt. The bolts 16 engage in a supporting plate 17 for the troweling disc 18, a section of rubber 19 or similar resilient material being interposed between the driving head 14 and the supporting plate 17. The shape of the apertures 15, as shown, is preferable in order that, in assembling, the bolt 16 may be seated in either end of the aperture corresponding to the direction of drive of the motor.

The troweling disc 18 as best shown in Fig. 2 has a central axial opening 20 therein, the material surrounding the opening being bevelled or rounded for an obvious purpose. This is likewise true at the periphery of the disc. This opening insures freedom from excessive suction and the results secured by the use of a disc so formed, so far as troweling is concerned, are very satisfactory. By cutting out the center of the disc I avoid a twisting action that would otherwise occur, that would tend to agitate the plastic material as distinguished from smoothing or ironing it. Furthermore, the provision for the central cutout area adds to the useful life of the disc in the matter of wear. Obviously, the distance traveled by the disc in contact with the surface varies from zero at the center or axis, to the maximum at the periphery; and consequently the wear on the disc is in the same proportion. By cutting out the center, a large part of the area that is subject to slight wear is eliminated, the wear of the remaining portion is more even and a plate can be used for a much longer time without replacement. In the absence of this provision the plate or disc would rather quickly assume the shape of a cone and its effectiveness for troweling would be gone.

The connection between the plate 17 and the disc 18 is preferably in the form of bowed or arched spring metal pieces 21, eight being shown in the illustration. These are joined to the plate 17 by means of the bolts 22 and to the disc 18 by welding at one or both ends of the pieces. These members together with the rubber section 19 provide a resilient connection to the superimposed frame and motor structure and serve to take up vibrations therebetween.

It will be noted that the bottom or floor-contacting surface of the disc 18 is in a substantially true plane and this should be maintained as nearly as possible as in no other manner can proper troweling or "ironing" be secured. It is also obvious that a material should be used for the disc that will furnish a very smooth and polished surface; furthermore, such a material should be highly resistant to wear. A steel having a substantial component of nickel or a similar element that will insure density and hardness is recommended. A formula for a steel of the recommended quality will be later supplied.

Of course, it will be understood that fairly good results may be secured by the use of ordinary steel in the disc and by omitting the cut-out area at the center. Also that other modifications may be made that will occur to those skilled in the art in the operation of the device. Therefore, I do not wish to be limited except as indicated in the appended claims.

I claim:

1. In a troweling device for finishing the surface of cementitious and similar materials, the combination of a disc having a smooth operating surface finished to a substantially true plane, a prime mover superimposed on the disc for rotating the same, and resilient means in the connection between the motor and disc.

2. In a troweling device for finishing the surface of cementitious and similar materials, the combination of a disc having a smooth operating surface finished to a substantially true plane and having an axial cut-out area, and a prime mover superimposed on the disc for rotating the same, said disc being composed of a relatively dense and hard metal to provide a smooth surface and to resist wear, the arrangement of the parts normally tending to maintain the face of the disc parallel to the plane of the surface being finished and the weight of the motor and its supporting parts acting to maintain a uniform downwardly-applied pressure on the troweling disc.

3. The method of troweling a cementitious floor which consists in laying the floor and preparing it for troweling, then allowing the cement in the floor surface to set beyond the point at which hand troweling would be practical, and then troweling the floor by passing over the same a driven flat member that is rotated in one direction in a plane.

4. In a trowelling device for finishing the surface of a cement floor, the combination of a disc having an operating surface finished to a substantially true plane, a prime mover superimposed on said disc for rotating the same, and means for manually directing said trowelling device over a floor, the arrangement of the parts being such that a uniform predetermined weight is applied to said disc during the process of trowelling.

5. In a troweling device for finishing the surface of a cement floor, the combination of a disc having a smooth operating surface finished to a substantially true plane, said disc having a central cut-out area, a prime mover superimposed on said disc for rotating the same, and means for manually directing said troweling device over a floor, the arrangement of the parts being such that a uniform predetermined weight is applied to said disc during the process of troweling.

6. The method of troweling a cementitious floor which consists in laying the floor and preparing it for troweling, then allowing the cement in the floor surface to set beyond the point at which hand troweling would be practical, and then troweling the floor by passing over the same a driven flat member that is rotated in one direction, and maintaining a substantially uniform downwardly directed pressure on said flat member.

HAROLD S. BOULTON.