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3,063,690

CONCRETE MILLING MACHINE

Filed Dec. 29, 1960

3 Sheets-Sheet 1

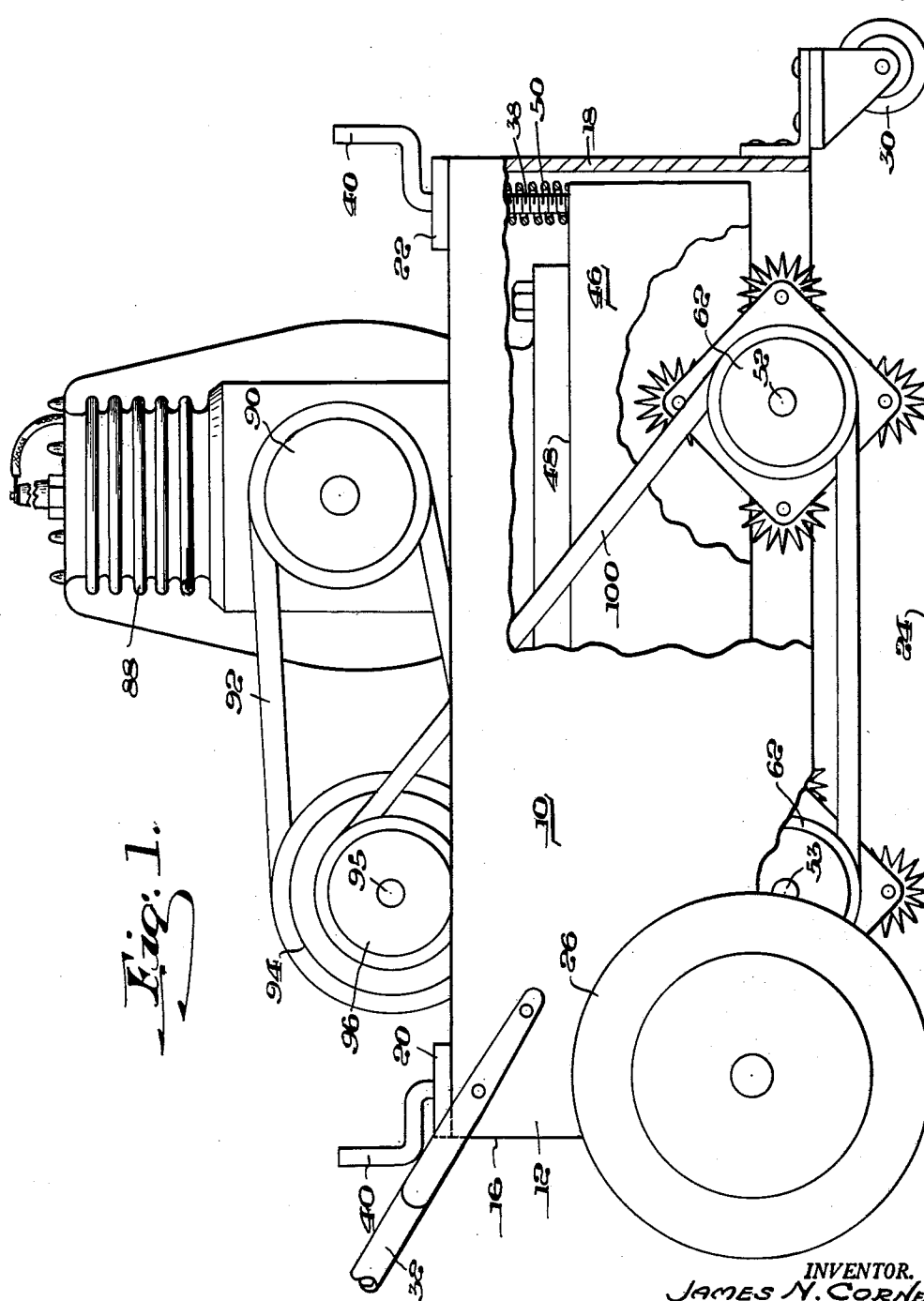


Fig. 1.

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3 Sheets-Sheet 2

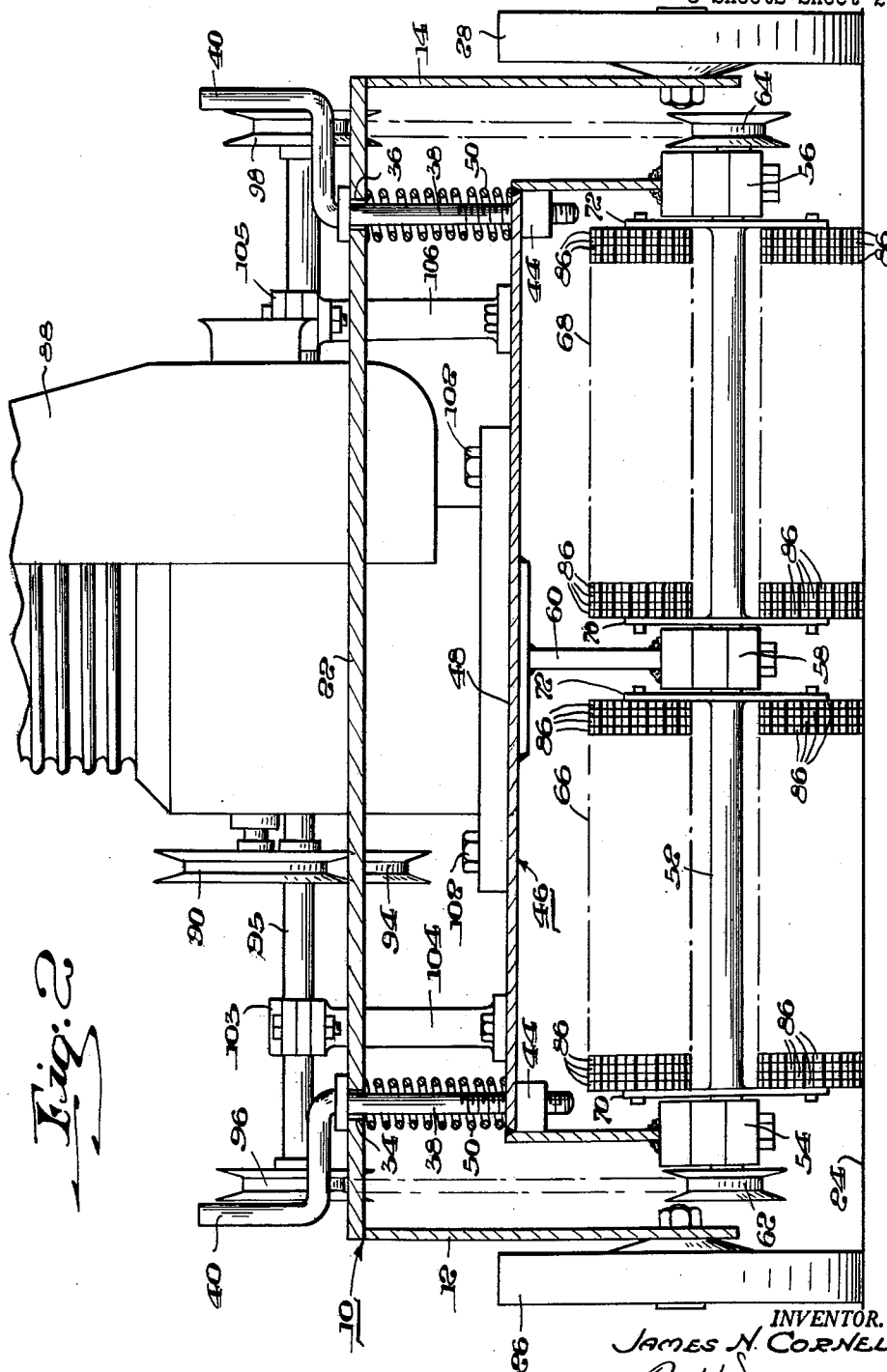


Fig. 2

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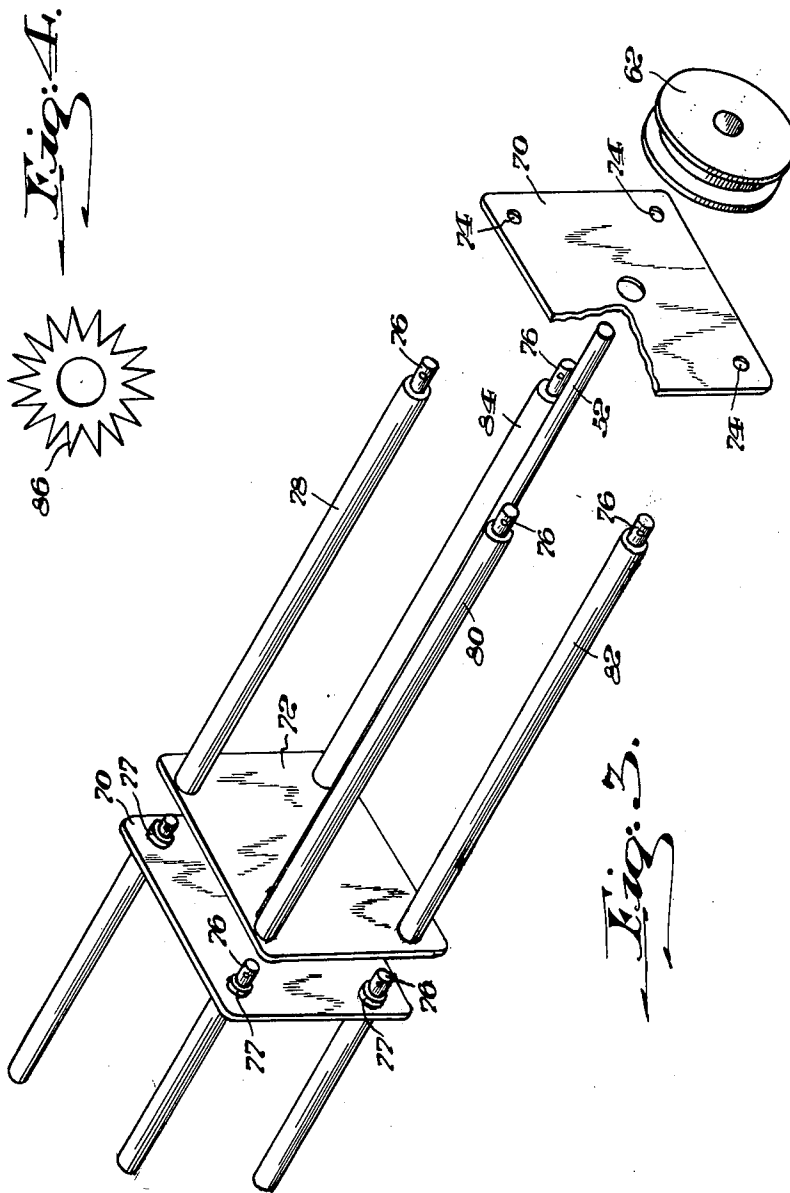
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CONCRETE MILLING MACHINE

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3 Sheets-Sheet 3



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CONCRETE MILLING MACHINE

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4 Claims. (Cl. 262—19)

This invention relates to apparatus for smoothing or polishing floor surfaces and the like, and more particularly to apparatus of the type described for milling concrete floors to obtain an even and uniform surface area.

As is known, the surface of a concrete floor, sidewalk or road, for example, may be finished by first levelling and rough smoothing with a wood float followed by hand finishing with a steel trowel. Alternatively, mechanical finishing tools may be used; but in either case, the finishing process is a tedious one requiring the use of skilled, or at least semi-skilled, labor. Even under ideal conditions, the resulting surface may be somewhat rough or contain undesirable ridges.

In the past, polishing or grinding machines have been devised for removing ridges and for general polishing purposes. Such machines usually employ abrasive grinding stones or the like which are mechanically rotated on the floor surface to produce the desired effect. One difficulty with such machines, however, is that the thickness of the surface layer removed cannot be readily controlled, meaning that with the use of such equipment it is possible to obtain an uneven, although possibly smooth, surface.

As an overall object, the present invention seeks to provide new and improved milling machine apparatus for removing a rough surface layer on concrete floors and the like to produce a perfectly flat and smooth condition, thereby making it possible to eliminate the costly and tedious finishing procedure heretofore required before the concrete hardened.

Another object of the invention is to provide a concrete milling machine of the type described which can be easily adjusted to remove a wide range of concrete surface layer thicknesses to suit requirements.

A further object of the invention is to provide a concrete milling machine which may be easily pushed over the floor surface worked upon and operated by unskilled personnel to provide a perfectly flat and even floor condition.

Still another object of the invention is to provide a device of the type described which is simple and economical in construction.

In accordance with the invention, wet concrete, after pouring, may be simply floated by unskilled labor and allowed to harden with a rough and more or less uneven surface. Thereafter, the milling machine of the invention may be pushed over the hardened surface to produce a perfectly smooth and even condition better than that obtainable by the conventional wet finishing procedure. Alternatively, the invention may be used to remove ridges or other surface irregularities on an otherwise smooth concrete surface.

The foregoing is accomplished in accordance with the invention by providing apparatus including a mobile outer frame having means for guiding it over a concrete or other similar surface which is to be worked upon. Disposed within the outer frame is a second vertically adjustable inner frame having one or more shafts carried thereby such that they will be generally parallel to the concrete surface to be worked upon and substantially transverse to the direction of movement of the frames. By providing banks of star-shaped cutter elements around the shaft, and by driving the shaft from a motor mounted on the inner frame whereby the motor and cutter elements may be adjusted upwardly or downwardly in unison, any thickness of the floor surface can be easily removed to

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produce a smooth and even condition by simply adjusting the vertical height of the second frame within the outer frame. This adjustment may be effected, for example, with screws carried by the outer frame and threadably engaging the inner frame whereby the vertical position of the inner frame and the motor and cutter elements carried thereby may be varied by turning the aforesaid screws.

The above and other objects and features of the invention will become apparent from the following detailed description taken in connection with the accompanying drawings which form a part of this specification, and in which:

FIGURE 1 is a partially broken-away side view of the concrete milling machine of the present invention;

FIG. 2 is a cross-sectional end view of the concrete milling machine of FIG. 1.

FIG. 3 is an exploded view of banks of star-shaped cutters employed in the invention; and

FIG. 4 is a side view of an individual star-shaped cutter of the type which may be used in the present invention.

Referring now to FIGS. 1 and 2, the assembly shown includes an outer open-ended rectangular frame member 10 having a pair of sidewalls 12 and 14 which are welded or otherwise securely fastened at their edges to end plates 16 and 18. Extending across the top of the rectangular frame member 10, adjacent the end plates 16 and 18, are a pair of horizontal supporting plates 20 and 22 which are welded to the end plates and the sidewalls 12 and 14, substantially as shown.

The frame member 10 is provided with means for guiding it over a concrete surface 24 which is to be worked upon, said guiding means comprising a pair of large diameter trailing wheels 26 and 28 which are bolted to the sidewalls 12 and 14, together with a castored wheel 30 (FIG. 1) at the lower frontal edge of the frame 10. The frame may be pushed over the concrete floor surface by means of a handle 32 which extends upwardly to about waist height.

Provided in the transversely-extending supporting plates 20 and 22, as best shown in FIG. 1, are pairs of holes 34 and 36 which receive the threaded shank portions 38 of four crank arms 40 located at the four corners of frame 10. As shown in FIG. 2, the shank portions 38 are threaded into blocks 44 which are welded or otherwise securely fastened to the four inside corners of a second rectangular frame member 46. Frame member 46 is similar to the outer frame member 10 and is provided with two side walls welded at their edges to two end plates. In this case, however, the top of the rectangular configuration is covered by a supporting plate 48. Interposed between the plate 48 and the undersides of the supporting plates 20 and 22 are four coil springs 50. With this arrangement, the vertical position of the frame member 46 may be adjusted by simply turning the crank arms 40 at each end of the assembly, while the coil springs 50 absorb vibration and maintain a constant pressure on frame member 46 to insure maximum surface contact of the star shaped cutter elements 86 and prevent the crank arms from turning under the effects of vibrational forces and the like.

Carried by the sidewalls of rectangular member 46, at the bottom thereof, are a pair of transversely-extending shafts 52 and 53. Each of the shafts, as shown in FIG. 2, is supported at its opposite ends by bearing blocks 54 and 56 which are welded to the lower edges of the sidewalls of rectangular frame member 46. Each shaft is also supported at its central portion by a third bearing block 58 carried on a centrally-disposed supporting member 60 which depends downwardly from the horizontal plate 48. At the opposite ends of each of the shafts are a pair of V-pulleys or chain sprockets 62 and 64 which

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are connected to rotary power means, hereinafter described.

As is best shown in FIGS. 2 and 3, each of the shafts 52 is provided with a pair of cutting or abrading assemblies 66 and 68 on either side of the member 60. Each assembly 66 or 68 includes a pair of spaced rectangular plates 70 and 72 which are welded or otherwise securely fastened to the shaft 52 whereby these plates will rotate in unison with the shaft. Provided at the four corners of each rectangular plate 70 and 72 are holes 74 which receive shafts 76. As shown, bushings 78—84 extend between each set of plates 70 and 72 and are fitted onto the shafts 76 which are provided with bores adapted to receive cotter pins or the like to retain the bushings in position, the arrangement being such that the shafts 76 are first passed through holes 74 and bushings 78—84 and thereafter fitted with washers 77 before the cotter pins are inserted. Each of the bushings 78—84 receives a plurality of steel star-shaped cutter elements 86, one of which is shown in FIG. 4. It comprises a generally circular configuration having a plurality of spikes or points circumferentially spaced about its periphery. It can be seen that when banks of such cutters 86 are placed over the bushings 78—84 and the shaft 52 rotated, the banks of cutter elements on the bars will successively engage the floor surface 24 to effect an abrading or cutting action which removes the surface layer of the concrete and produces a level, smooth condition.

The shafts 52 and the banks of cutter elements carried thereby are rotatably driven by means including a one cylinder gasoline engine, generally indicated at 88, it being understood that an electric motor could be used with equal effectiveness if desired. The output shaft of engine 88 is provided with a V-pulley 90 which is connected through belt 92 to a driven pulley 94 on shaft 95. Shaft 95, in turn, is provided with V-pulleys or chain sprockets 96 and 98 which are connected through belts or roller chains 100 to pulleys or chain sprockets 62 and 64, respectively, on the opposite ends of shafts 52 and 53. As will be understood, clutch means, not shown, may be provided to selectively tighten the belt 92 whereby rotation of the shaft 95 as well as shafts 52 may be controlled.

It will be noted that the engine 88 and the shaft 95 are supported on the vertically movable inner frame 46 along with the shafts 52 and the banks of cutter elements carried thereby. That is, engine 88 is mounted on the horizontal supporting plate 48 by means of bolts 102; and the shaft 95 is supported on this same plate by means of bearing blocks 103 and 105 carried on upright supporting stands 104 and 106, respectively. Thus, by turning the crank arms 40 at the opposite ends of the frame 10, the entire assembly of inner frame 46, engine 88, shaft 95, the shafts 52, and the banks of cutter elements carried thereby will be raised or lowered in unison, depending upon the direction of rotation of the crank arms. With this arrangement, the cutter elements may be adjusted in height to remove any desired thickness of the surface layer of the concrete floor 24. At the same time, because of the spacing between wheels 26, 28 and 30, the device will move over the floor surface along a true horizontal plane regardless of any slight variations in surface level to produce a perfectly flat milled condition.

Although the invention has been shown in connection with a certain specific embodiment, it will be readily apparent to those skilled in the art that various changes in form and arrangement of parts may be made to suit requirements without departing from the spirit and scope of the invention.

I claim as my invention:

1. A concrete milling machine comprising a mobile frame having means for guiding it over a concrete surface which is to be worked upon, said frame having four vertical sidewalls defining an open-ended generally

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rectangular configuration, a pair of spaced supporting members extending across the open top end of the rectangular configuration, a second vertically movable rectangular frame positioned within the first-mentioned frame and having a closed top and an open bottom, screws extending through said supporting members at the four corners of said rectangular configuration and threadedly engaging said second frame whereby the vertical position of the second frame may be adjusted by turning the aforesaid screws, the screws being independently adjustable such that the sides, front and back of said rectangular frame may be at different vertical heights, a pair of shafts extending between opposite sides of said second frame at the bottoms thereof such that they will be generally parallel to the concrete surface to be worked upon and generally transverse to the direction of movement of said frames, rotary power means supported on the top of said second frame and connected to the shafts for rotating them, spaced plates fixedly journaled to said shafts, a plurality of circumferentially spaced bars extending between said plates, and a bank of circular star-shaped cutter elements carried by each of said bars in side-by-side relationship, the arrangement being such that as the power means rotates the shafts, the banks of cutter elements will successively engage the surface to be milled, and coil springs surrounding said screws and interposed between the top of said second frame and the undersides of said supporting members.

2. A milling machine comprising a mobile frame having means for guiding it over a surface which is to be worked upon, said frame having four vertical sidewalls defining an open-ended generally rectangular configuration, a pair of spaced supporting members extending across the open top end of the rectangular configuration, a second vertically movable rectangular frame positioned within the first-mentioned frame and having a closed top and an open bottom, screws extending through said supporting members at the four corners of said rectangular configuration and threadedly engaging said second frame whereby the vertical position of the second frame may be adjusted by turning the aforesaid screws, the screws being independently adjustable whereby the second frame may be tilted with respect to said rectangular configuration, a pair of shafts extending between opposite sides of said second frame at the bottoms thereof such that they will be generally parallel to the surface to be worked upon and generally transverse to the direction of movement of said frame, rotary power means supported on top of said second frame and connected to the shafts for rotating them, and cutter elements carried by said shafts whereby the cutter elements will engage the surface to be milled as the shafts are rotated by said power means.

3. A milling machine comprising a mobile frame having means for guiding it over a surface which is to be worked upon, said frame having four vertical sidewalls defining an open-ended generally rectangular configuration, a pair of spaced supporting members extending across the top end of the rectangular configuration, a second vertically movable rectangular frame positioned within the first-mentioned frame and having a closed top and an open bottom, screws extending through said supporting members at the four corners of said rectangular configuration and threadedly engaging said second frame whereby the vertical position of the second frame may be adjusted by turning the aforesaid screws, said screws being independently adjustable whereby the second frame may be tilted with respect to said rectangular configuration, at least one shaft extending between opposite sides of said second frame at the bottoms thereof such that it will be generally parallel to the surface to be worked upon and generally transverse to the direction of movement of said frames, means for rotating said shaft, and abrading elements carried by said shaft and adapted to engage the surface to be milled as the shaft rotates.

4. The milling machine of claim 3 and including spring

devices interposed between the top of said second frame and the undersides of said supporting members to absorb vibration and maintain a constant pressure on the second frame to insure maximum surface contact of the abrading elements with the surface to be milled.

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