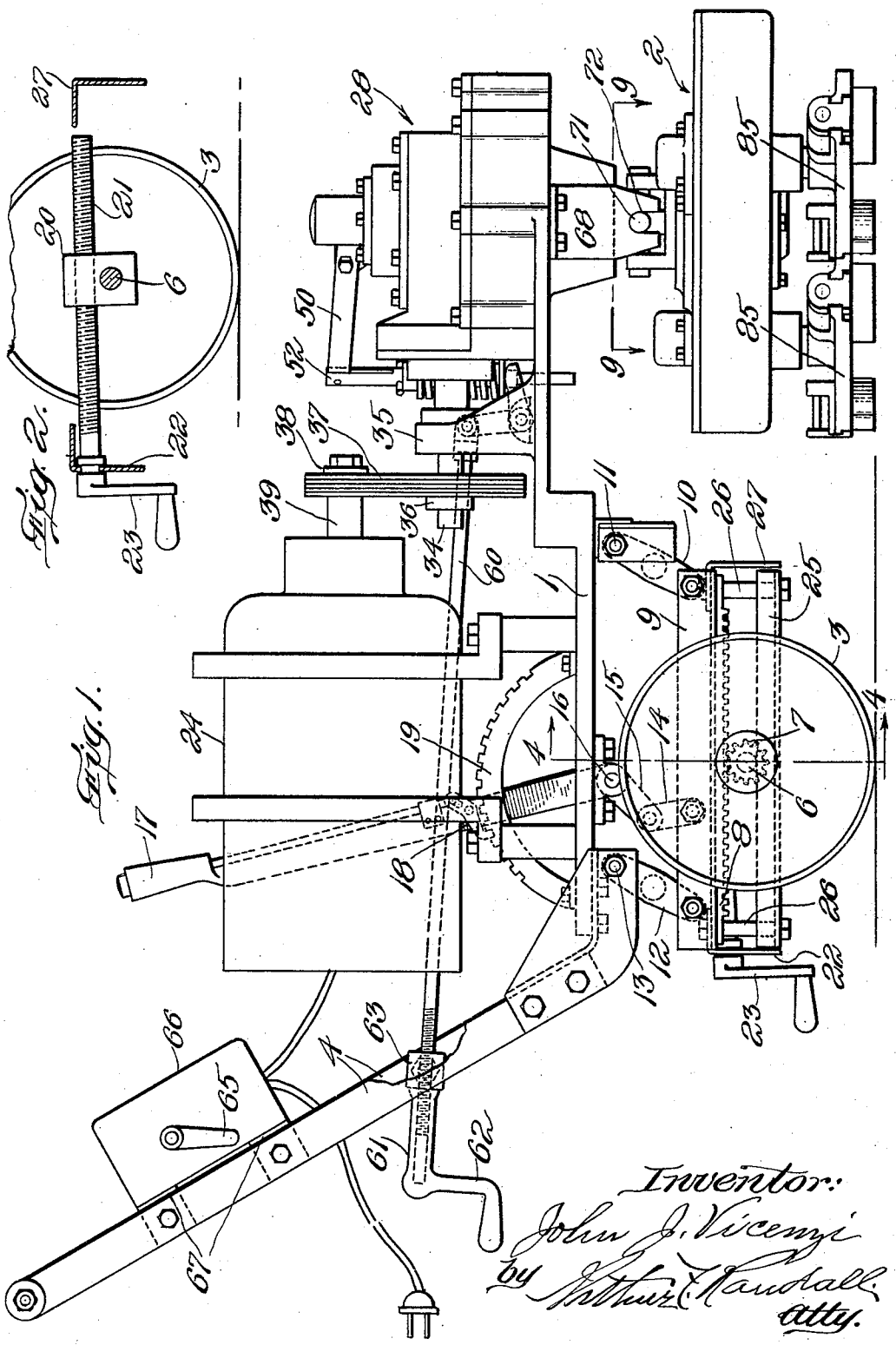
March 14, 1933. J. J. VICENZI 1,901,681

FLOOR SURFACING MACHINE

Filed Oct. 10, 1929 4 Sheets-Sheet 1



March 14, 1933. J. J. VICENZI 1,901,681

FLOOR SURFACING MACHINE

Filed Oct. 10, 1929 4 Sheets-Sheet 2

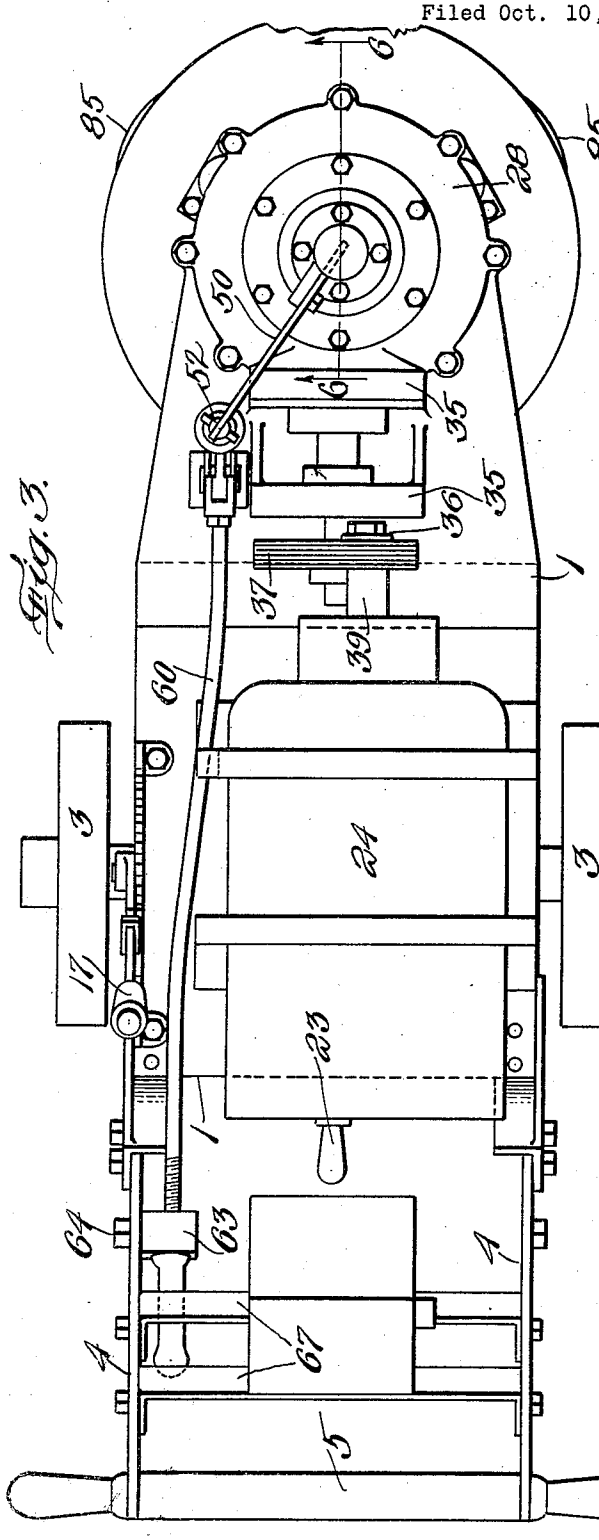


Fig. 3.

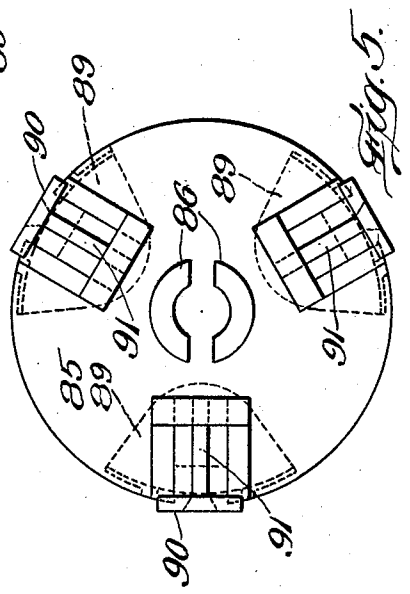


Fig. 5.

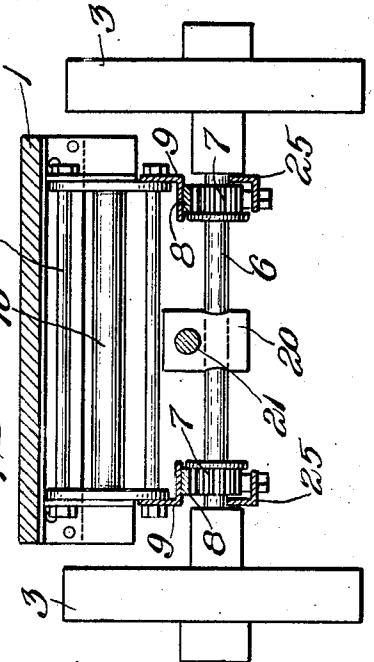


Fig. 4.

Inventor:
John J. Vicenzi
by Arthur E. Randall
Atty

March 14, 1933. J. J. VICENZI 1,901,681

FLOOR SURFACING MACHINE

Filed Oct. 10, 1929 4 Sheets-Sheet 3

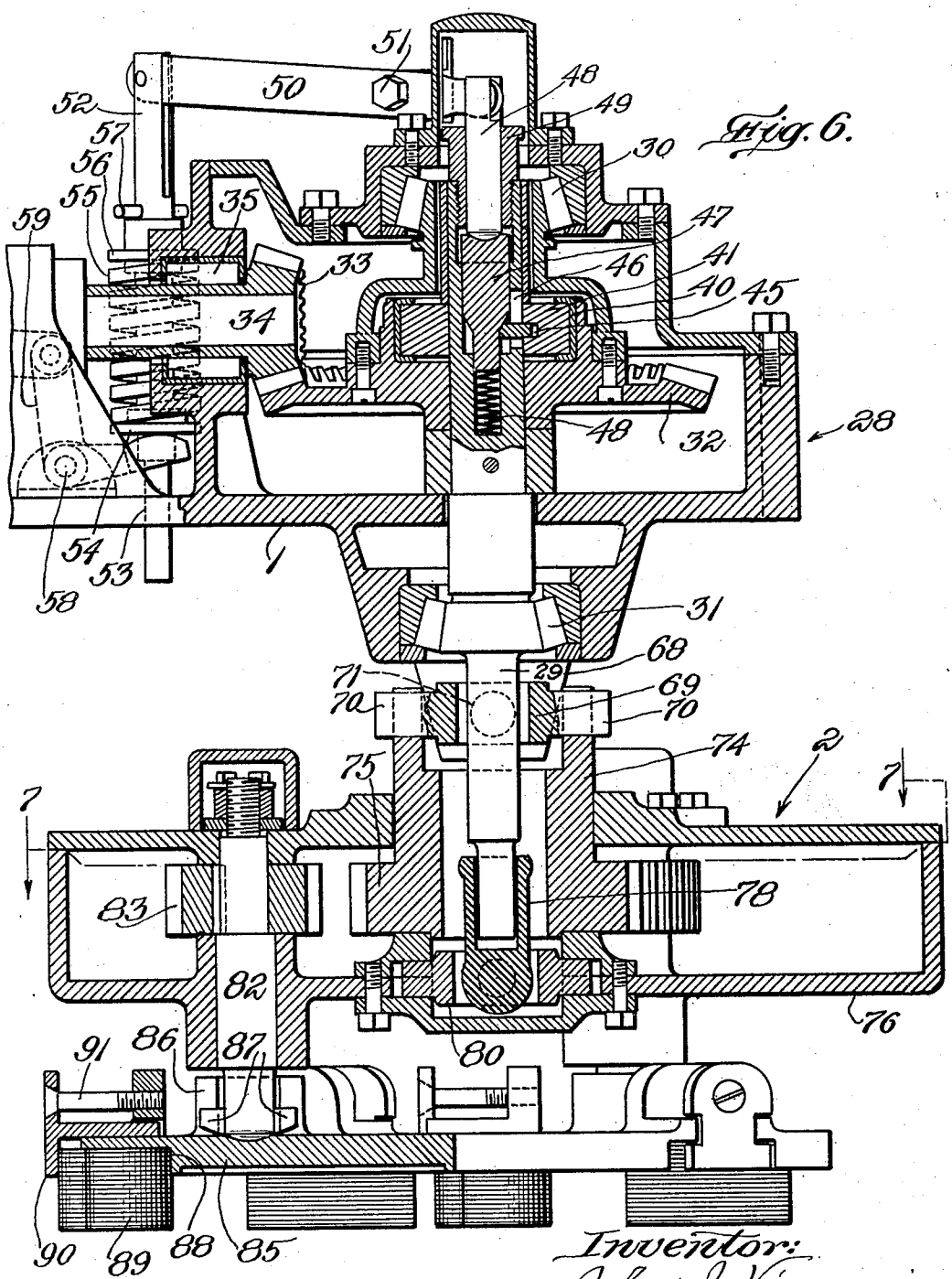


Fig. 6.

Inventor:
John J. Vicenzi
by Arthur E. Randall
Atty.

March 14, 1933. J. J. VICENZI 1,901,681

FLOOR SURFACING MACHINE

Filed Oct. 10, 1929 4 Sheets-Sheet 4

Fig. 7.

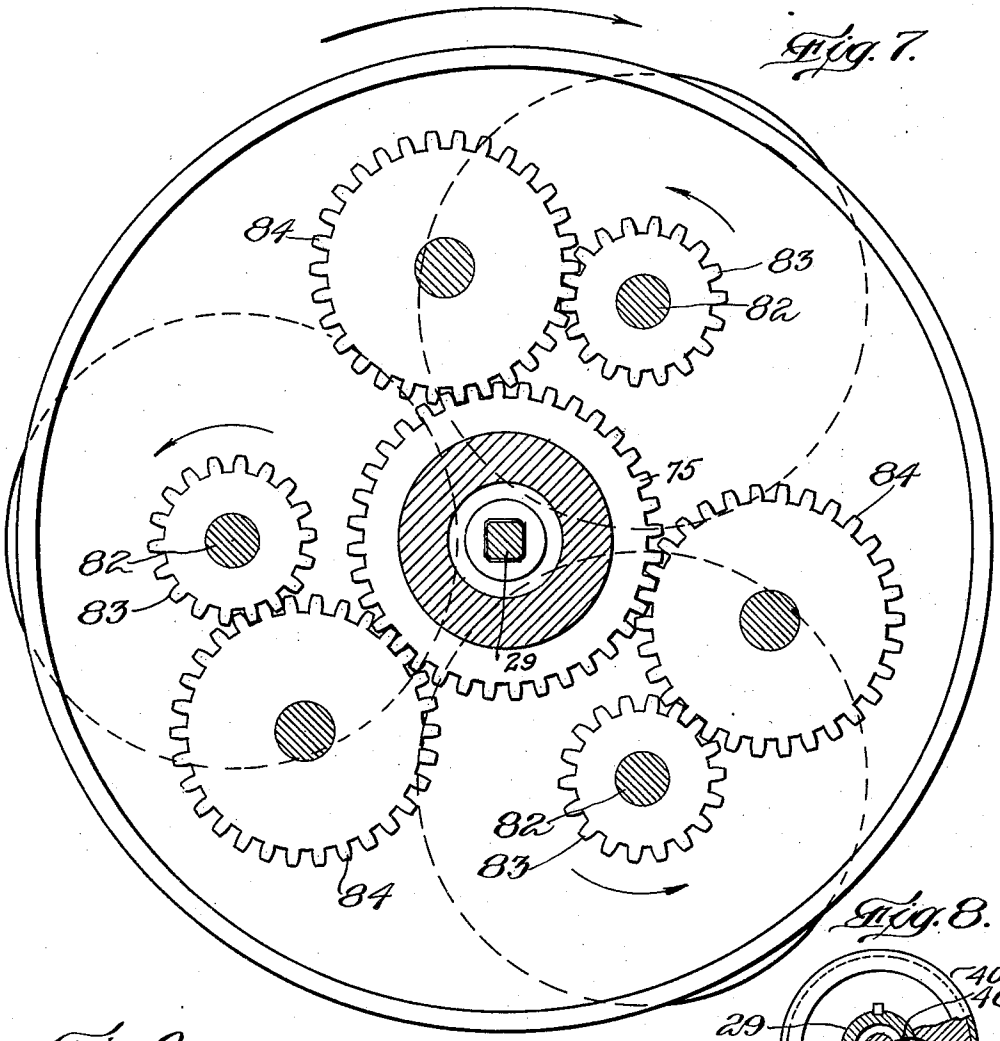


Fig. 8.

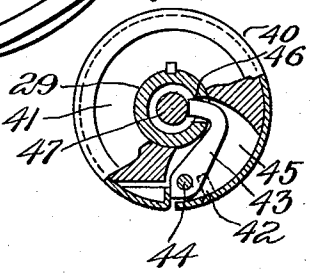
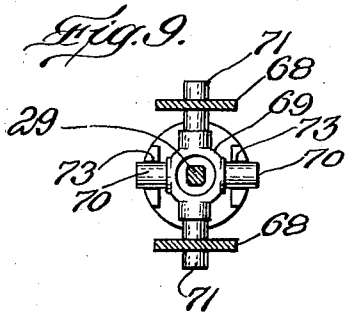


Fig. 9.



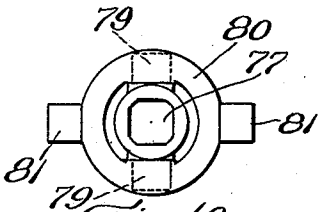


Fig. 10.

Inventor:
John J. Vicenzi
by William F. Randall
Atty.

Patented Mar. 14, 1933 1,901,681

UNITED STATES PATENT OFFICE

JOHN J. VICENZI, OF BOSTON, MASSACHUSETTS

FLOOR SURFACING MACHINE

Application filed October 10, 1929. Serial No. 398,682.

My invention relates to floor surfacing machines including machines for finishing or polishing the surfaces of artificial stone floors such as are made from marble terrazzo, cement and the like and it has for its object to provide an improved machine of this class.

To this end I have provided an improved machine of the kind referred to having the peculiar features of construction and mode of operation set forth in the following description, the several novel features of the invention being particularly pointed out and defined in the claims at the close thereof.

The embodiment of my invention herein illustrated includes a truck comprising a body on which is mounted a motor, preferably an electric motor, which operates through certain intermediate connections to drive a vertically disposed shaft journaled in bearings on said body. At the lower end of this shaft is provided a head that is connected with the lower end of said shaft by a universal joint so that said head is free to fit itself accurately to the floor upon which it rests and upon which it is operating while said shaft acts through said universal joint to rotate the same.

Another feature of the invention consists in constructing the grinding head with a plurality of vertically disposed spindles each equipped at its lower end with a holder for an abrasive material. These spindles are arranged on the head around the axis of said shaft and through suitable intermediate gearing are all connected with a centrally disposed gear journaled on the head that is concentric with the axis of said shaft and which is held against rotating with the head by the body of the truck.

Another feature of this invention consists in providing a coupling member between said centrally disposed gear and the body of the truck through which the former supports the latter, said coupling member being constructed to permit said gear to rock in all directions laterally with the head as the latter fits itself to the floor.

In the machines for grinding cement floors and the like the grinding devices are held against the floor under considerable pressure which latter is usually supplied by the weight of the head and parts supported by the same. It follows therefore, that if the motor is started while connected with the head the inertia of the latter together with the excessive frictional engagement between the grinding elements and the floor offers so great resistance to the motor it frequently happens that either the motor is burned out or the fuse in the circuit of the motor is blown.

In order to obviate this objectionable feature characterizing machines of this class as heretofore constructed, I provide a manually operated friction clutch as part of the power transmitting mechanism connecting the rotatable head and the motor so that the motor may be fully started independently of said head while this clutch is unset after which the clutch may be set, thus avoiding subjecting the apparatus to injurious shocks and loads.

The bottom of the rotatable head of a surfacing machine for operating upon floors made from marble, terrazzo, cement or the like, is equipped with renewable blocks of grinding or polishing material which, under continuous use of the machine, are worn down to a useless size and condition in a few hours. As a result the end of the truck on which the normally vertical shaft is journaled is gradually lowered during the use of the apparatus, and as it is desirable for several reasons to maintain the axis of said shaft always perpendicular to the plane of rotation of the head and to the floor, I have herein provided, as a feature of the present invention, novel means for supporting the opposite, or rear end of the body of the truck which provides for vertical adjustment thereof to compensate for wear of the floor-engaging blocks and to compensate for change in the height of the head occasioned by renewal of the blocks.

Another feature of my invention provides for constructing the truck so that the pressure of the head against the floor can be varied, within predetermined limits, as desired.

Other features of my invention are hereinafter pointed out.

In the accompanying drawings:

Figure 1 is a side elevation of a floor surfacing machine constructed in accordance with my invention.

Figure 2 is a detail hereinafter described.

Figure 3 is a plan view of the machine shown in Fig. 1.

Figure 4 is a section on line 4—4 of Fig. 1.

Figure 5 is a top plan view of one of the block holders hereinafter described.

Figure 6 is a section on line 6—6 of Fig. 3.

Figure 7 is a section on line 7—7 of Fig. 6.

Figure 8 is a plan view, partly in section, of the clutch hereinafter described.

Figure 9 is a section on line 9—9 of Fig. 1.

Figure 10 is a detail, in plan, of the universal joint hereinafter described.

The floor surfacing machine illustrated in the accompanying drawings is constructed to include a truck or vehicle comprising a cast metal body 1 whereof one end is supported by a grinding or surfacing head 2 and the opposite end by a pair of wheels 3, 3.

To the rear end of body 1 are rigidly secured the lower ends of a pair of upwardly and rearwardly extending handle-bars 4, 4 equipped at their upper ends with a handle 5 by means of which the operator moves the truck about on the floor that is being operated upon by the head 2.

During the operation of the machine most of the weight of the parts between a perpendicular plane extending through the axes of the wheels 3, Fig. 1, and the front end of body 1, as well as all of the weight of the head 2, is utilized and operates to forcibly press the latter down against the floor to cause said head to efficiently act thereon, and it is a feature of this invention that the parts of the machine are constructed and associated so that this weight, and therefore the pressure of the head 2 against the floor, can be varied as desired, within predetermined limits.

To this end the wheels 3 are loosely mounted upon an axle 6 carrying a pair of pinions 7, 7, Figs. 1 and 4, on each of which rests a toothed rack 8 secured in position against the under side of a longitudinally disposed bar of angle-iron 9. The bars 9 are disposed adjacent opposite sides of the body 1 and have their forward end portions pivotally connected with the lower ends of a double link 10 whose upper ends are pivotally mounted upon a cross-bar 11 forming part of the frame of the machine.

The rear end portions of the bars 9 have pivotally connected therewith the lower ends of a double link 12 whose upper ends are pivotally mounted on a cross-bar 13 forming part of the frame of the machine.

Each side bar 9 is connected by a link 14 with an arm 15 fast on a rock-shaft 16 journaled in bearings provided upon the under side of body 1, and at one end thereof the rock-shaft 16 has fixed thereon an upwardly extending hand-lever 17 provided with a manually operated spring pressed latch 18 normally engaging a toothed sector 19 on the frame of the machine to hold the side-bars 9 fixedly in position relatively to body 1, but with provision for adjustment of said lever to raise and lower the rear end of body 1.

At its middle the axle 6 extends loosely through a block 20, Figs. 2 and 4, which is formed with a transverse threaded hole that is occupied by a screw 21 whose rear end portion extends through, and is rotatably confined against endwise movement within, a hole provided through an angular cross-bar 22 fixed at its opposite ends to the side-bars 9. At its rear outer end the screw 21 is provided with a crank handle 23 by means of which it is manually rotated to shift block 20, axle 6 and wheels 3 lengthwise with relation to the side-bars 9, the pinions 7 rolling on the racks 9 and serving to ensure equal movement of the opposite ends of the axle.

The head 2 is rapidly rotated by an electric motor 24 as presently to be described and this motor which is quite heavy is fixedly mounted upon the body 1 above the racks 8 which are made of such length that when the screw 21 is operated to position the axle 6 at the forward ends thereof practically the whole weight of motor 24 is at the rear thereof so that the head 2 is relieved of the same and the weight of the parts of and on the truck forward from axle 6 is partly counterbalanced to a substantial degree. It will be clear also, that when the screw 21 is adjusted to position the axle 6 at or near the rear ends of the racks 8 practically all of the weight of the motor 24 is forward or ahead of said axle thus supplementing the weight of the forward end of the body and of the head 2 in pressing the latter against the floor. In this way the pressure of the head 2 downwardly against the floor can be varied as desired.

The pinions 7 are held in mesh with the racks 8 by side bar sections 25 of angle iron, each of which is directly below one of the side bar sections 9 and fastened near its opposite ends to the latter by bolts 26. Thus each pair of bar sections 9 and 25, together with their bolts 26 make up a complete side bar of the frame of the running gear or chassis of the truck, said side bar having a longitudinal slot through which the adjacent end portion of the axle 6 extends so that the latter is held against movement away from the racks 8 thereof by the lower bar section 25.

The forward ends of the two bar sections 9 are permanently and rigidly connected by a cross-bar 27 of angle-iron shape in cross-section.

Near its forward end the body 1 is constructed with a housing 28 within which is arranged the upper portion of a shaft 29 that is supported in a vertical position by conical roller bearings 30 and 31 on body 1.

On shaft 29 is loosely mounted a relatively large bevel gear 32 meshing with a smaller beveled gear 33 fast on the forward end of a short horizontal longitudinally disposed shaft 34 journaled in roller bearings 35 provided on body 1.

Near its rear end the shaft 34 has fast on it a sprocket wheel 36 connected by a sprocket chain 37 with a sprocket wheel 38 fast on the armature shaft 39 of the motor 24.

The top side or face of the large beveled gear 32 is made with a cylindrical counterbore within which is provided a contractible and expansible friction clutch member 40, Figs. 6 and 8, consisting of a split ring co-operating with the annular wall of the counterbore which serves as the other member of the clutch.

This split ring 40 is mounted upon a collar 41 keyed to the shaft 29 and to which one end of the split ring is fastened at 42. The opposite end of the split ring co-operates with one arm of a lever 43 pivotally mounted at 44 within a slot 45 provided in the collar 41.

The other arm of lever 43 extends through a slot 46 formed in shaft 29 to the interior of the latter whose upper portion is made hollow or tubular to receive within it a wedge member 47 in the form of a plunger that is circular in cross-section and made with an intermediate tapered or conical portion to engage the lever 43. The lower reduced end portion of the plunger 47 is seated upon a spring 48 which yieldingly urges the plunger upwardly.

Abutting the upper end of the wedge member 47 is a push-bar 48 slidably mounted within a bushing 49 provided at the upper end of the shaft 29. The upper end of push-bar 48 co-operates with one arm of a lever 50 fulcrumed at 51 on the housing 28 whose other arm is pivotally connected with the upper end of a stem or spindle 52, the lower end of spindle 52 occupying a hole provided in the body 1 so that said spindle is maintained in a vertical position.

Slidably mounted on the spindle 52 is an abutment collar 54 on which is seated a stiff spring 55 whose upper end bears against another abutment collar 56 that is held in a fixed position on the spindle 52 by a pin 57 extending through the latter.

Fulcrumed at 58 on the body 1 is a bell-crank lever 59 whereof one arm is forked and embraces the spindle 52 immediately below the collar 54 against which it bears. To the other arm of bell-crank 59 is pivotally connected one end of a link 60 in the form of a round rod having its rear end portion threaded as shown in Fig. 1.

Upon the threaded rear end portion of the link 60 is mounted a nut 61 made with a crank arm 62 by means of which it is rotated. This nut 61 bears against an abutment block 63 fastened at 64 to one of the handle-bars 4.

When the machine is in operation the nut 61 is screwed up tight against the abutment block 63 so that the link 60 acts through the bell-crank 59 to forcibly urge collar 54 upwardly thereby compressing the spring 55 sufficiently to cause it to act through spindle 52, lever 50 and push-bar 48 to yieldingly force the wedge-member 47 downwardly. When the wedge-member is thus held forced downwardly it acts through the lever 43 to maintain the split ring 40 expanded and in clutching engagement with the large beveled gear 32. Thus under these conditions the shaft 29 is being continuously rotated by gear 32.

To stop the rotation of shaft 29 by gear 32 the nut 61 is unscrewed until the pressure of spring 48, Fig. 6, is sufficient to raise the wedge member 47. When said wedge member is thus raised its pressure against the lever 43 is removed which permits the split ring 40 to contract and unclutch from the gear 32. When the clutch is thus unset the large gear 32 is idly rotated by the gear 33 and shaft 29 remains at rest.

When the motor 24 is to be started to place the machine in condition for use the nut 61 is first unscrewed sufficiently to unset the clutch after which the operator starts the motor by adjusting the member 65 of a control box 66 mounted upon cross-bars 67 fastened at their ends to the handle-bars 4. When the motor is in operation at full speed the nut 61 is manually screwed up and acts through the spring 55 to yieldingly and gradually set the clutch through which the rotating gear 32 then drives the shaft 29. In this way injurious shocks heretofore imposed upon the mechanism are avoided and burning out of the motor or blowing out of fuses is obviated.

At its forward end the body 1 is made with a pair of depending arms 68, Figs. 1, 6 and 9, between which is disposed a coupling member comprising a ring 68 having two pairs of integral radially extending trunnions 70 and 71. The trunnions 71 occupy socket-slots 72 provided at the lower ends of arms 68 and by engagement with the inner ends thereof support the body 1, while the trunnions 70 rest in socket-slots 73 provided at the upper end of the hub 74 of a master gear 75 that is within the head 2.

It will be apparent that each trunnion 70 and 71 is free to rock and to also move endwise to a limited extent within its socket-slot.

This provides a connection between the head 2 and body 1 through which the former supports the latter and which not only permits the head to rock or tilt universally to fit itself to the floor, but also holds the gear 75 against rotation, said gear being made hollow and concentrically surrounding the lower end portion of the shaft 29 which extends through it.

The head 2 comprises a hollow cast iron box frame 76 within which the gear 75 is arranged so as to be supported by the bottom wall thereof.

The lower end portion of shaft 29 is made square in cross-section and fits telescopically into the square socket 77, Figs. 6 and 10, of the member 78 of a universal joint of ordinary construction. This member 78 is made with oppositely disposed trunnions 79 journaled in an outer ring member 80 made with a pair of oppositely disposed trunnions 81 rotatably confined within sockets provided upon the bottom wall of box 76.

The two pairs of trunnions 79 and 81 are at right angles to each other thus providing for universal rocking or tilting movement of box 76 relatively to shaft 29.

Journaled in bearings provided upon the box 76 are three vertically disposed spindles 82 arranged equidistant around the gear 75 and on each is keyed a pinion 83 connected by an intermediate gear 84 with the stationary gear 75.

Each spindle 82 extends downwardly to the exterior of box 76 where it rests upon the body 85 of a block holder that is made upon its top side with a socket boss 86 into which the lower end of the spindle is telescopically fitted. Each socket boss 86 is made with oppositely disposed longitudinal slots occupied by key lugs 87 projecting from its spindle through which rotary motion of the latter is transmitted to the block holder.

Each holder body 85 is of disk-like shape and is made upon its under side with peripheral sockets 88 within each of which a block 89 of carborundum, emery, or the like, is clamped by means of a jaw 90 and screw 91.

The described connection between each holder and the lower end of its spindle provides a universal joint which allows the holder to fit itself to the floor independently of the box 76. That is, the box 76 is free to tilt or rock in any direction to fit all of the holders to the floor and at the same time each holder is free to tilt or rock in any direction to fit itself to the floor. This is a novel and desirable feature of my machine.

The abrasive blocks 89 are two or three inches in height and are worn down to a useless thickness in about eight hours when new ones are substituted.

During the operation of the machine the wear of the blocks 89 gradually lowers the forward end of body 1 but by means of the hand lever 17, adjusted by the operator at intervals during the operation of the machine, the rear end of the body is correspondingly lowered to maintain the body 1 horizontal, or approximately so.

What I claim is:

1. A machine of the character described comprising a truck including a body; a motor mounted on said body; a rotatable head for operating upon the floor including a frame carrying a plurality of vertically disposed spindles journaled on said frame each of which is provided at its lower end with a floor engaging tool; means through which said motor rotates said head including a vertical shaft journaled on and supported by said truck body; a universal joint connecting the lower end of said shaft with said head so that the latter can tilt laterally in all directions relatively thereto and through which said shaft rotates said head, and gearing carried by said head for rotating said spindles on their own axes as said head is rotated, said gearing including a master gear that is concentric with respect to the axis of said head, and a universal joint connecting said master gear with said body by which said master gear is held against rotating with said head and by which one end of said body is supported.

2. A machine of the character described comprising a truck including a body; a motor mounted on said body; a rotatable head for operating upon the floor including a frame carrying a plurality of vertically disposed spindles journaled thereon to the lower end of each of which a floor engaging tool is connected so that it can tilt universally relatively thereto; means through which said motor rotates said head including a vertical shaft journaled on said trunk body; a universal joint connecting the lower end of said shaft with said head so that the latter can tilt laterally relatively thereto in all directions and through which said shaft rotates said head, and spindle rotating gearing carried by said frame and connected with said truck body independently of said shaft, said gearing including a gear member on said frame through which the lower end portion of said shaft extends out of contact therewith, and a universal joint through which said gear member supports one end of said body and by which said gear member is held against rotating.

3. A machine of the character described comprising a truck including a body; a motor mounted on said body; a rotatable head for operating upon the floor including a body carrying a plurality of vertically disposed spindles journaled thereon to the lower end of each of which a floor engaging tool is connected so that it can tilt universally relatively thereto; means through which said motor rotates said head including a vertical shaft

journaled on said body; a universal joint connecting the lower end of said shaft with said head so that the latter can tilt laterally relatively thereto and through which said shaft rotates said head, and spindle rotating means carried by said head and connected with said body independently of said shaft, including a universal joint through which said head supports one end of said body.

4. A machine of the character described comprising a truck body; a motor mounted upon said body; a rotatable head supporting one end of said body; means through which said motor operates said head; a truck chassis movably connected with said truck body; a hand lever fulcrumed on said body; means connecting said lever and chassis through which the latter supports the opposite end of said body and through which said lever acts to raise and lower said end when adjusted on its fulcrum; means for securing said lever in adjusted position; wheels adjustably connected with said chassis, and means operable to adjust said wheels on said chassis toward and from said head to vary the weight imposed thereon.

5. A machine of the character described comprising a truck including a body; a pair of wheels for supporting one end of said body; an axle connecting said wheels; a pair of pinions fast on said axle, one near each end thereof; a pair of longitudinally disposed racks of teeth connected with said body and each meshing with one of said pinions; a motor mounted on said body in proximity to said wheels; a rotatable tool-carrying head resting on the floor and supporting the opposite end of said body; means through which said motor operates to rotate said head, and a manually operated screw rotatably supported by said truck and operable to shift said axle and wheels toward and from said head as said pinions traverse said racks.

Signed by me at Boston, county of Suffolk and State of Massachusetts, this 4th day of October, 1929.

JOHN J. VICENZI.