May 10, 1932. C. J. OLSON 1,857,564

FLOOR SURFACING MACHINE

Filed May 15. 1928 6 Sheets-Sheet 1

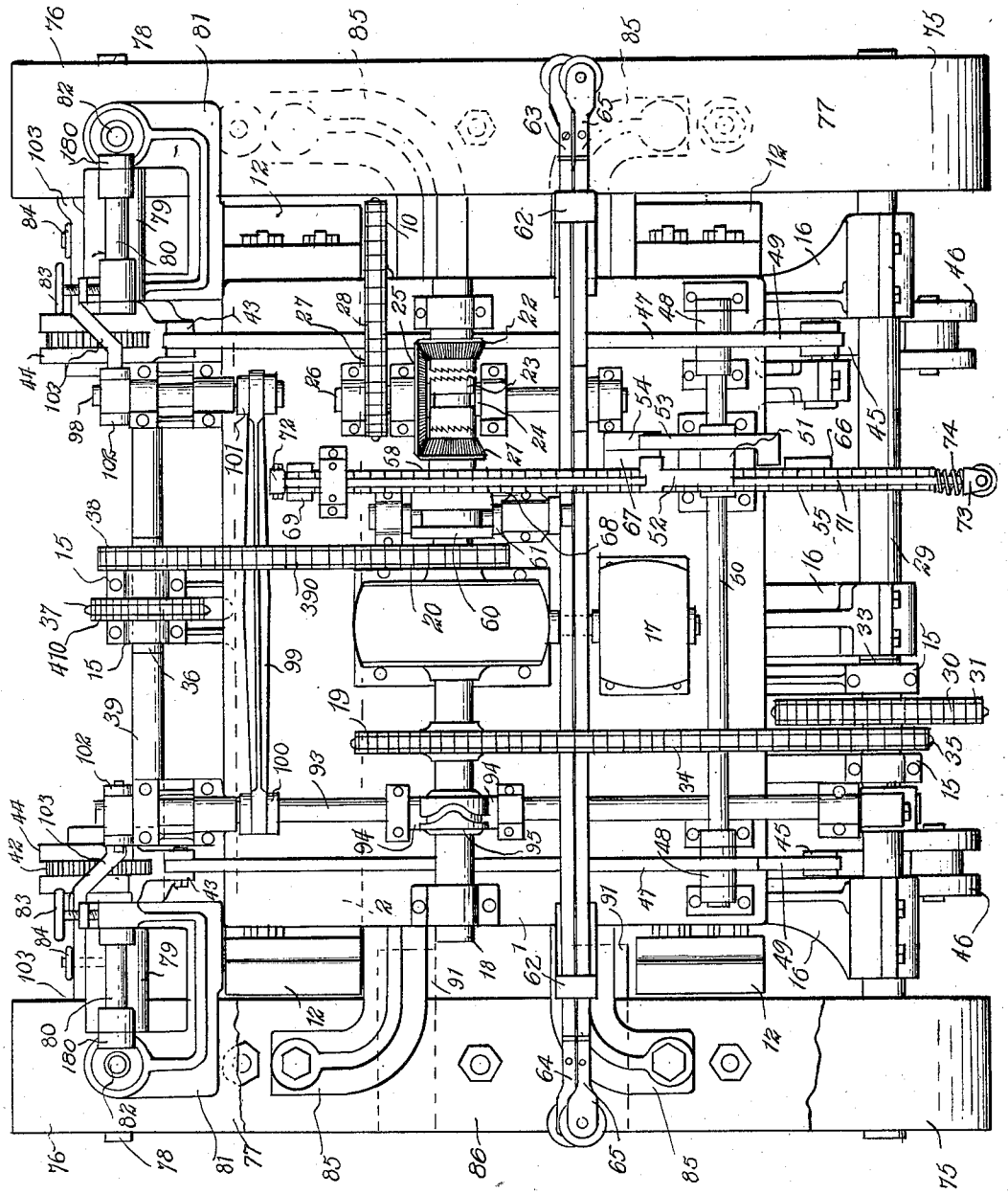


Fig. 1.

Inventor

C. J. Olson

By Lacey & Lacey, Attorneys

May 10, 1932. C. J. OLSON 1,857,564

FLOOR SURFACING MACHINE

Filed May 15. 1928 6 Sheets-Sheet 2

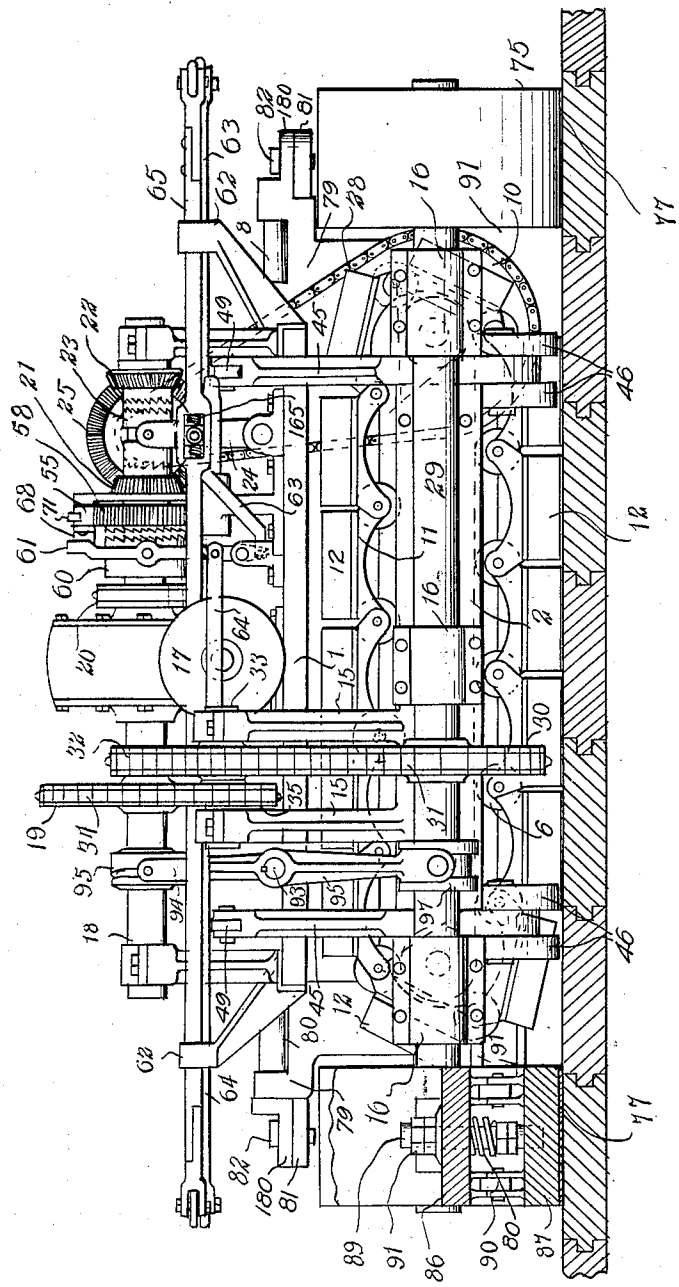


Fig 2.

Inventor

C. J. Olson

By Lacey & Lacey, Attorneys

May 10, 1932. C. J. OLSON 1,857,564

FLOOR SURFACING MACHINE

Filed May 15. 1928 6 Sheets-Sheet 3

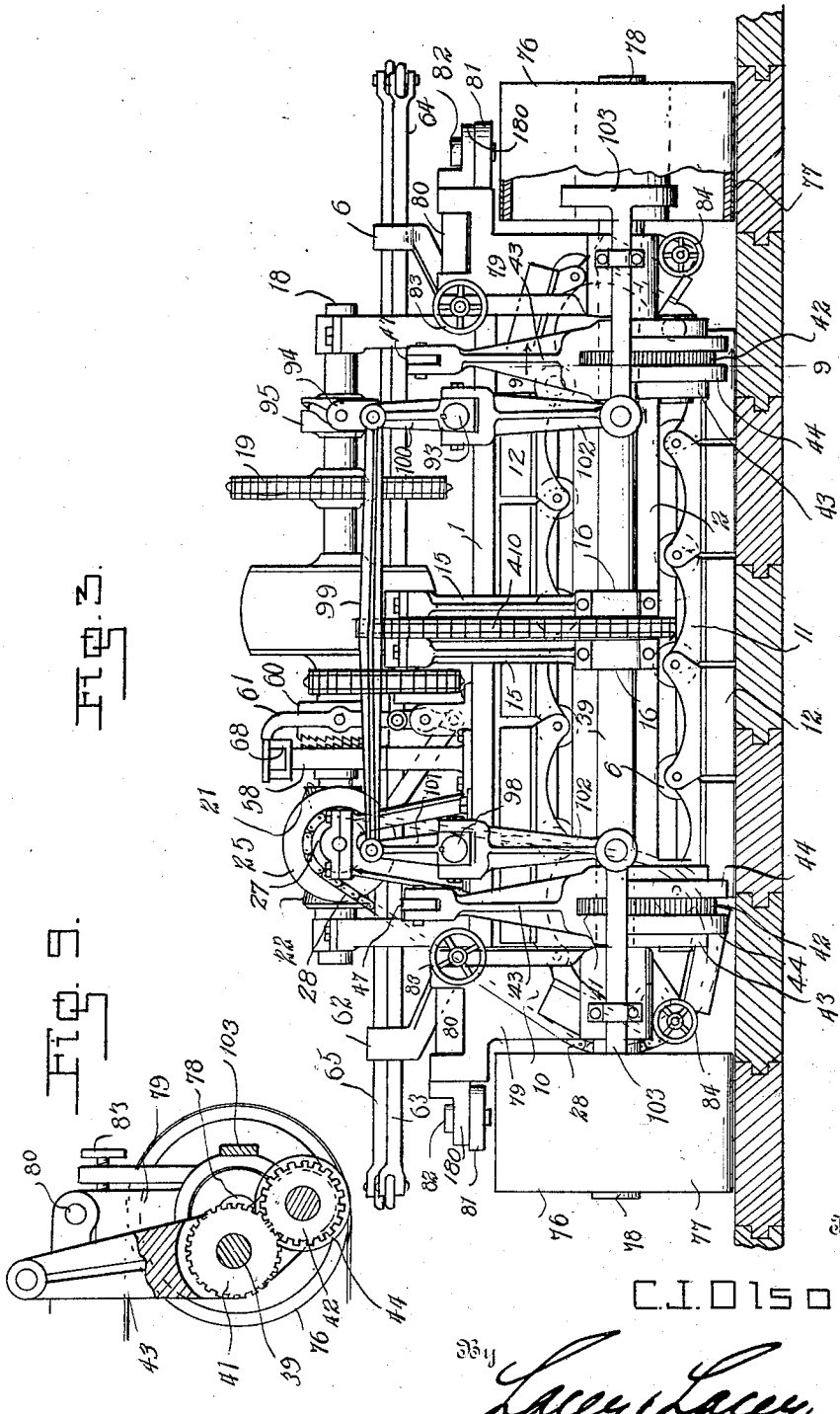


Fig. 5.

Fig. 5.

Inventor

C. J. Olson

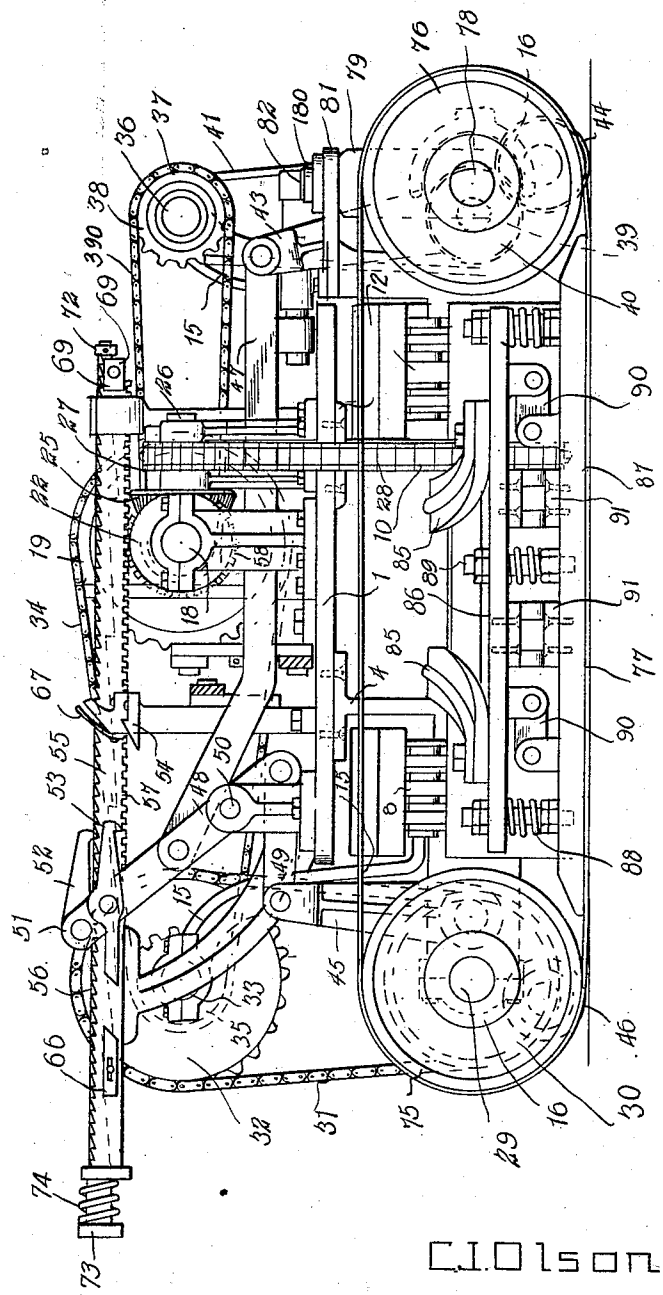
By Lacey & Lacey, Attorneys

May 10, 1932. C. J. OLSON 1,857,564

FLOOR SURFACING MACHINE

Filed May 15. 1928 6 Sheets-Sheet 4

Fig 4.



Inventor

C. J. Olson

By Lacey & Lacey, Attorneys

May 10, 1932. C. J. OLSON 1,857,564

FLOOR SURFACING MACHINE

Filed May 15. 1928 6 Sheets-Sheet 5

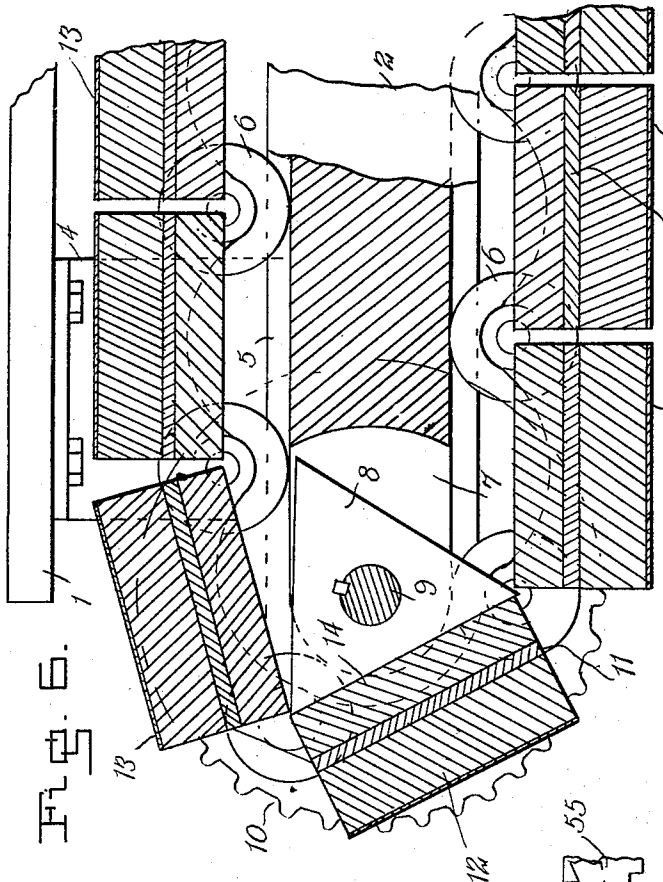


Fig. 6.

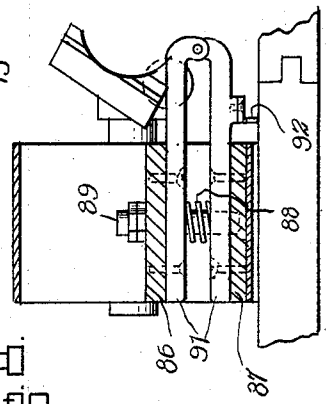


Fig. 8.

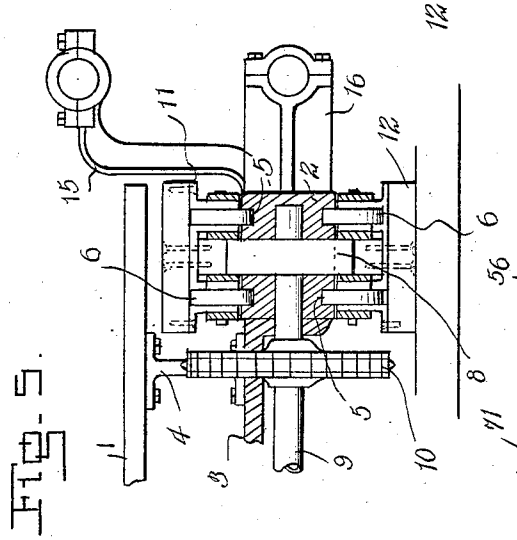


Fig. 5.

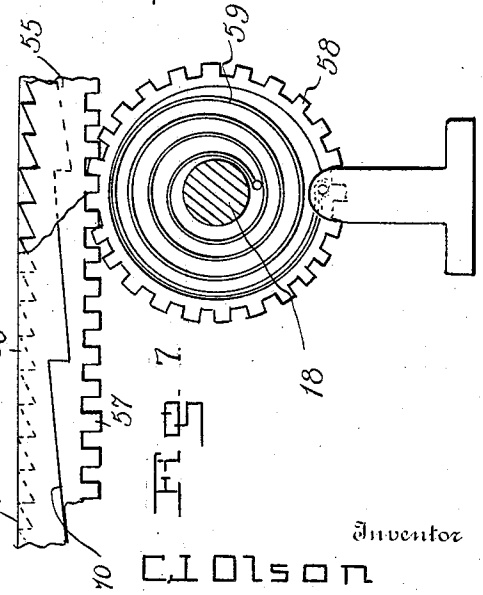


Fig. 7.

Inventor

C. J. Olson

By Lacey & Lacey, Attorneys

May 10, 1932. C. J. OLSON 1,857,564

FLOOR SURFACING MACHINE

Filed May 15. 1928 6 Sheets-Sheet 6

Fig. 10.

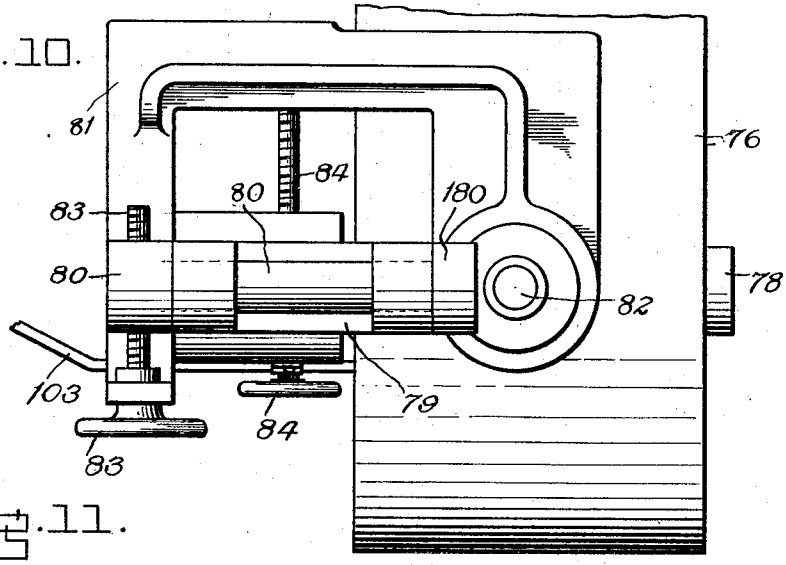


Fig. 11.

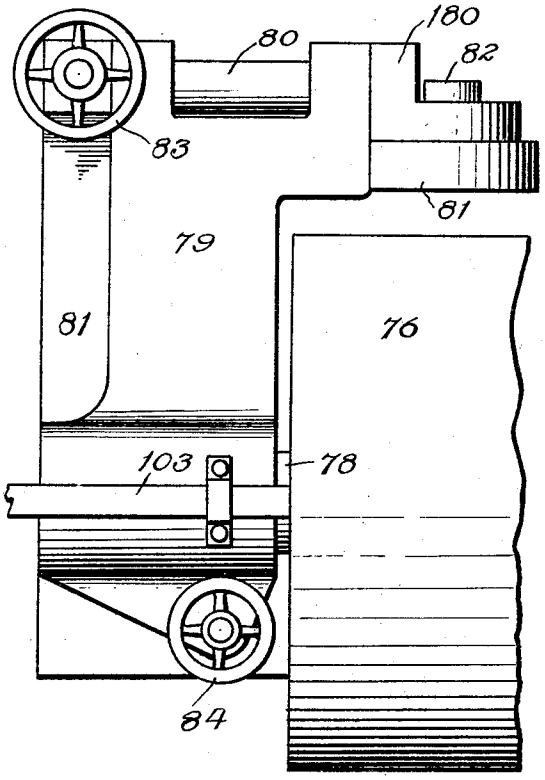
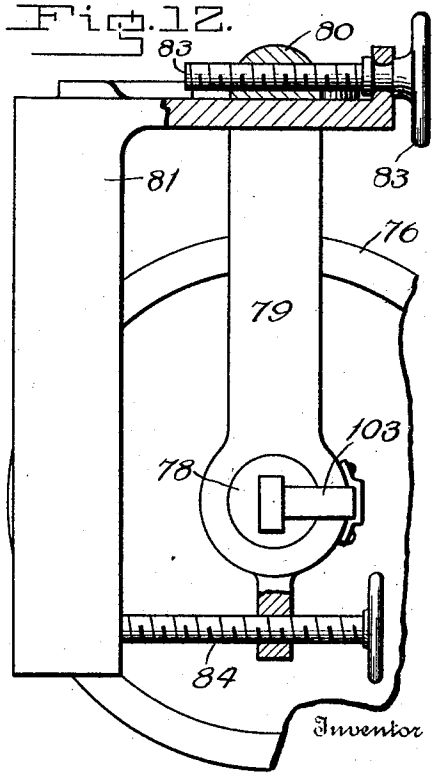


Fig. 12.



Inventor

C. J. Olson

By Lacey & Lacey, Attorneys

Patented May 10, 1932 1,857,564

UNITED STATES PATENT OFFICE

CHARLES J. OLSON, OF MUSKEGON, MICHIGAN

FLOOR SURFACING MACHINE

Application filed May 15, 1928. Serial No. 278,011.

This invention relates to floor surfacing machinery and provides an article of this nature which is effective and rapid in operation and which results in a finished surface free from scratches and spots since all the coating, such as varnish and shellac, is entirely removed from old floors.

The invention provides a machine which, when adjusted, requires but little attention, as it is automatic in reversing when reaching the end of its travel in each direction.

The invention further provides means for lifting the tractor and surfacing mechanism clear of the floor when the side of the room has been reached and maintaining such parts in elevated position until adjustment has been made to adapt the machine to a continuance of the work.

The invention provides surfacing mechanism operating at a right angle to the path of travel of the machine and simultaneously receiving a reciprocatory movement to obviate the formation of scratches in the finished surface.

While the drawings illustrate a preferred embodiment of the invention, it is to be understood that in adapting the means to meet specific needs and requirements, the design may be varied and changes in the minor details of construction may be resorted to within the scope of the invention as claimed, without departing from the spirit thereof.

For a full understanding of the invention and the merits thereof, reference is to be had to the following description and the drawings hereto attached, in which,—

Figure 1 is a top plan view of the floor surfacing machine embodying the invention, the upper run of a surfacing belt being broken away.

Figure 2 is a side view of the machine partly in section, showing it in position upon a floor.

Figure 3 is a view similar to Figure 2, of the reverse side of the machine.

Figure 4 is an end view of the machine.

Figure 5 is a fragmentary sectional view illustrating in detail the tractor mechanism.

Figure 6 is an enlarged detail sectional view of an end portion of the tractor mechanism.

Figure 7 is an enlarged fragmentary sectional view of a portion of the elevating mechanism for lifting the tractor and surfacing mechanism.

Figure 8 is a fragmentary sectional view of the surfacing mechanism.

Figure 9 is a detail sectional view on the line 9—9 of Figure 3, looking in the direction of the arrows.

Figure 10 is a top plan view of the means for adjusting the surfacing belt.

Figure 11 is a side view.

Figure 12 is an end view of the same.

Corresponding and like parts are referred to in the following description and designated in the several views of the drawings by like reference characters.

The numeral 1 denotes a platform which may be of any determinate structure depending upon the design and capacity of the machine. The motor, shifting and clutch mechanisms are mounted upon the platform and the propelling and surfacing mechanisms are disposed approximately below the platform, power being transmitted thereto from the motor by suitable gearing and connections. A side bar or frame 2 is located at each side of the machine some distance below the platform 1. Ties 3 connect the frames 2 and support struts 4 which are secured thereto, and to the platform 1. The frames 2 are of like construction and each has its ends of circular outline. Parallel grooves or channels 5 are formed in the tops, bottoms and ends of each of the frames 2 and receive peripheral portions of rollers 6. A mortise 7 is formed in each end of the frames 2 intermediate the grooves or channels 5 to receive a polygonal pulley 8 of triangular outline which is keyed to a shaft 9 and upon one shaft 9 is mounted a gear element 10.

There are provided endless chains, one for each groove or channel 5 of each of the frames 2. Each of these endless chains comprises links 11 which are connected by pins upon which the rollers 6 are mounted. Blocks 12 are fastened to the outer sides of the links 11 and constitute shoes which make contact

with the surface of the floor to be dressed or leveled. To prevent slipping and insure positive traction the outer surfaces of the blocks or shoes 12 are roughened in any convenient manner, as by having sand paper 13 applied thereto. The flat faces of the pulleys 8 correspond in length to blocks 14 which are secured to the inner sides of the links 11 and make contact with the faces of the pulleys when traveling around the same. The shafts 9, one at each end of the frame 2, are journaled at their ends in the said frames. One of the shafts is positively driven through power applied to the element 10. Two sets of brackets designated by the numerals 15 and 16 project from the outer sides of each of the frames 2. The brackets 15 project upwardly and laterally. The brackets 16 extend horizontally These brackets terminates in bearings in which shafts are mounted for a purpose explained more fully hereinafter.

A suitable motor 17 is mounted upon the platform 1 and power is taken therefrom to operate the working parts. It is preferred to utilize an electric motor, and its shaft is suitably geared to a main shaft 18 which is disposed intermediate the endless tractors and parallel therewith. Sprocket wheels 19 and 20 are fast to the shaft 18 so as to rotate therewith. Bevel gears 21 and 22 are mounted loosely on the shaft 18 and each is provided upon its inner side with a half clutch to cooperate with a clutch member 23 splined to the shaft 18 and shiftable by means of a lever 24, these gears and clutch members being located between the sprockets 20 and the end of the machine. A bevel gear 25 is in mesh with the bevel gears 21 and 22, and is fast to a transverse shaft 26. A sprocket gear 27 fast to the shaft 26 is connected by means of a sprocket chain 28 with the sprocket gear 10 fast to the shaft 9. In this manner the endless tractors are driven for propelling the machine over the surface to be dressed.

A shaft 29 is mounted in the bracket 16 at one side of the machine and extends across the machine with its ends projecting beyond the ends of the frames 2. A sprocket gear 30 is fast to the shaft 29 and a sprocket chain 31 connects the sprocket gear 30 with a sprocket gear 32 fast to a short shaft 33 mounted in the brackets 15.

A sprocket chain 34 connects the sprocket gear 19 with a sprocket gear 35 fast to the shaft 33. In this manner power is transmitted from the main shaft 18 to the shaft 29. A short shaft 36 is located at the opposite side of the machine and is mounted in the adjacent bracket 15. Sprocket wheels 37 and 38 are fast to the shaft 36 and a sprocket chain 390 connects the sprocket wheel 38 with the sprocket wheel 20. A shaft 39 below the shaft 36 is mounted in the bracket 16 and has a sprocket gear 40 fast thereto, which gear is operatively connected by a sprocket chain 410 with the sprocket wheel 37. Through the instrumentalities just described motion is imparted to the shaft 39 from the main shaft 18. A spur gear 41 at each end of the shaft 39 is in mesh with a spur gear 42 mounted in the lower end of a lever 43. Small wheels or rollers 44 are disposed at the sides of the spur gear 42 and are of slightly larger diameter to prevent contact of the spur gears with the surface of the floor when the levers are rocked to cause the rollers to bear thereon. Levers 45 similar to the levers 43 are located at the opposite end of the machine and support small wheels 46 corresponding to the rollers 44. Bars 47 form parts of connecting means between the levers 43 and 45 and each bar is pivotally connected at one end to the respective lever 43.

A bar 48 pivoted intermediate its ends has its upper end connected to the bar 47 and its lower end connected by means of a link 49 to the lever 45. Movement of the bar 47 in one direction effects a simultaneous movement of the levers 43 and 45 to lower the respective wheels 44 and 46 so as to elevate the machine and permit it to travel sidewise on said wheels. Movement of the bar 47 in the opposite direction elevates the wheels 44 and 46 to permit a lowering of the machine to bring the surfacing and tractor mechanisms in contact with the surface to be leveled and finished. A shaft 50 mounted in suitable bearings provided upon the platform 1 has the bars 48 fast thereto with the result that the four levers 43 and 45 receive a simultaneous movement. An arm 51 projects upwardly from the shaft 50 and is provided at its upper end with pawls 52 and 53 which are pivotally connected thereto on its opposite sides. A catch 54, which is supported in a fixed position above the platform, is adapted to be engaged by and coact with the pawl 53 to hold the arm 51 in the adjusted position when the wheels 44 and 46 are lowered to elevate the machine. A transverse bar 55 slidable in bearings provided therefor at the upper ends of standards or posts on the platform is provided upon its top side with ratchet teeth 56 to be engaged by the pawl 52 and upon its lower side with cog teeth 57. This bar 55 projects beyond the side of the machine, as shown in Figure 4, and in actual practice will project a distance equal to the width of the machine.

A gear wheel 58 loose on the shaft 18 has its teeth in mesh with the cog teeth 57 of the bar 55, and is hollow to receive a coil spring 59 which is fast at one end to any convenient fixed point and at its opposite end to the gear wheel. This gear wheel is provided upon one side with a half clutch to coact with a clutch member 60 splined to the shaft 18. A lever 61 coacts with the clutch member 60 to effect engagement thereof with the gear wheel

58 and cause the gear wheel to rotate with the shaft 18 in one direction for tensioning the spring 59, and to release the gear wheel to admit of a reverse movement thereof by the action of the spring 59 after the gear wheel has been released. The lever 61 is fulcrumed a short distance from its lower end and is pivotally connected to a bar which is slidably mounted in bearings 62 and includes sections 63 and 64, the inner end of the section 63 being offset and pivotally connected to the lower end of the lever 61 while the inner end of the section 64 is pivoted to the lever 61 above its fulcrum. As a result of this arrangement the sections 63 and 64 comprising the bar move in opposite directions. A bar 65 coextensive in length with the sectional bar and slidably mounted in the same bearings 62 is yieldably connected to the lever 24 cooperating with the clutch member 23.

The bar 65 is longitudinally slotted at 165 to receive a block connected to the lever 24 and springs at opposite sides of the block as shown in Fig. 2, whereby to insure positive action of the clutch member 23 when, in starting the machine the bar 65 is moved manually longitudinally in either direction to clutch one or the other of the bevel gears 21 and 22 to the shaft 18 according to the desired direction of travel of the machine. The continuous and sectional bars are of a length to project beyond the ends of the machine to strike the wall or other object at the ends of floor or surface to be finished and be thereby shifted, whereby to reverse the travel of the machine. A trip 66 is carried by the bar 55 and is adjustably connected to a side thereof in alinement with and outwardly from the pawl 53. The opposing ends of the trip 66 and pawl 53 are correspondingly beveled with the result that when the beveled end of the trip rides upon the beveled end of the pawl the latter is rocked and disengaged from the catch 54. A lifter 67 disposed in the path of the pawl 52 disengages the same from the teeth 56 of the bar 55 and this takes place a moment after the pawl 53 reaches a position to engage the catch 54, thereby holding the arm 51 in the adjusted position with the wheels 44 and 46 in contact with the surface and the machine elevated. The lifter 67 consists of a flat spring and is backed by a reinforcement which sustains the initial stress incident to the pawl riding upon the lifter when clearing the tooth 56 with which it is in engagement.

The pawl 53 is set slightly in advance of the pawl 52 and when in engagement with the catch 54 relieves the pawl 52 of all stress and admits of the pawl 52 being held clear of the teeth 56 by the spring action of the lifter 67. A stop 68 mounted upon the bar 55 is adapted to engage the upper end of the lever 61 and move it and the clutch member 60 to release the gear wheel 58 when the bar 55 reverses its movement. A stop 69 at the inner end of the bar 55, by contact with the adjacent bearing, limits its movement in one direction against the tension of the spring 59. A groove or channel is formed in the top side of the bar 55, and the bottom wall thereof is formed with teeth 70. A bar 71 is loosely fitted within this groove or channel and its bottom side is correspondingly toothed to match the teeth 70. The bar 71 normally has its top side in the plane of the teeth 56 of the bar 55, and is slidable in the bearings in which the bar 55 is mounted. The bar 71 projects beyond the ends of the bar 55 and is provided at one end with a stop 72 and at its opposite end with a stop 73. An open coil spring 74 mounted upon the projecting end of the bar 71 and confined between the stop 73 and the adjacent end of the bar 55 holds the bar 71 at the limit of its movement in one direction.

When the projecting end 73 of the bar 71 comes in contact with a wall or other object said bar is pressed inwardly against the tension of the spring 74, and its teeth riding upon the teeth 70 effect a vertical movement of the bar which thereupon binds in the bearings in which the bars 71 and 55 are slidably mounted. This constitutes a temporary locking means to secure the bar 55 until such time as the gear wheel 58 is clutched to the shaft 18 to impart movement to the bar 55, whereupon the bar 71 returns to normal position under the action of the spring 74. This latter movement of the bar 71 is limited by the stop 72 at the end thereof remote from the stop, or head 73.

Pulleys 75 and 76 are located at opposite ends of the machine and at opposite sides thereof and support endless belts 77 which are coated upon their outer surfaces with an abrading material of a nature to effect a leveling and finishing of a floor to be surfaced. The pulleys 75 and 76 at the respective ends of the machine are in line. The pulleys 75 are fast to opposite ends of the shaft 29 and are positively driven. The pulleys 76 are loosely mounted upon short shafts 78 which are mounted in brackets 79 pivoted upon axles 80 mounted in brackets 81.

The brackets 81 form a part of the main frame and the axles 80 have their outer ends 180 suitably shaped to be pivoted to the outer ends thereof as indicated at 82. The axles 80 and brackets 79 are adjusted angularly by means of set screws 83 which are swiveled in the frame or the bracket 81 and are threaded through the inner ends of the respective axles 80 so as to turn the axles and the brackets 79 about the pivot 82 and also serve to hold the axles in the required adjusted position. The brackets 79 being mounted upon the axles 80 move therewith and in consequence the shafts 78 may be angularly adjusted to parallel the shaft 29 whereby to bring the outer elements of the pulleys 75 and 76 into

position to properly support the endless belt 77. The brackets 79 are adapted to swing at their lower ends to move the shafts 78 towards and away from the shaft 29, whereby to properly tension the endless belt 77. Set screws 84 are threaded through the lower extremity of the respective brackets 79 and bearing against the side of the respectively adjacent brackets 81 for adjusting the lower ends of the brackets 79 toward or from the shaft 29 and maintaining them in the required adjusted position. It will be understood that the brackets 79 have a two-fold adjustment, the one about the pivot 82 and the other about the axles 80, and this admits of the pulleys 76 having a corresponding dual adjustment. Arms 85 project from the respective ties 3 at opposite ends of the machine and carry bars 86 which are located intermediate the top and bottom runs of the respective endless belts 77.

Pressure bars 87 are located below the bars 86 and are yieldably connected thereto. The pressure bars 87 extend between the pulleys 75 and 76 and normally exert a pressure upon the lower runs of the belts 77 to maintain them in level contact with the surface operated upon. Springs 88 are interposed between the bars 86 and 87 and are mounted upon pins 89. The bars 87 and the tension of the springs 88 may be adjusted by nuts threaded upon the pins 89. Links 90 disposed between the bars 86 and 87 are connected at their ends to lugs projecting from said bars. See Figure 4. Short cross bars 91 are secured to the bars 86 and 87 and project inwardly therefrom and are pivotally connected at their inner ends as shown most clearly in Figure 8 of the drawings. The cross bars 91 and links 90 maintain the pressure bars 87 in given position and relieve the pins 89 and springs 88 of any tendency to bind. When the machine is brought into position for use, it will rest on the tractor shoes 12 and on small bars or feet 92 which are pivoted to a convenient part of the framework, as the lower cross bars 91, to depend therefrom to the floor so that there will be a slight space between the floor and the bar 87 to which the springs 88 will yield so that the belts 77 may be easily changed. These feet 92 automatically turn on their pivots to swing out of the way and assume a trailing position, when the machine is moved in either direction, to permit the belts to meet the floor surface.

The abrasive or surfacing belts 77 receive a simultaneous lateral movement which prevents the formation of scratches in the finished surface. This is effected by a lateral movement of the pulleys 75 and 76, the pulleys 75 being fast to the ends of the shaft 29 and moving therewith while pulleys 76 are loose on the shaft 78 and move thereon. A shaft 93 paralleling the belt 77 is mounted in bearings connected with the platform 1 and extends approximately from one side of the machine to the opposite side. An arm 94 projects upwardly from the shaft 93 and terminates in a fork which coacts with a cam 95 fast to the shaft 18. As shown, the cam 95 consists of a wheel formed in its periphery with a cam groove of a shape to impart an oscillatory movement to the arm 94 and a rocking movement to the shaft 93. An arm 96 fast to the shaft 93 and depending from the end thereof adjacent the shaft 29 coacts with said shaft to impart a longitudinal reciprocatory movement thereto. The lower end of the arm 96 terminates in a fork which coacts with an annularly grooved pulley 97 fast to the shaft 29 to move therewith. A short shaft 98 parallels the shaft 93 and is connected thereto by means of a link 99 and arms 100 and 101 which project upwardly from the respective shafts, the arrangement being such as to cause the shafts 93 and 98 to rock in unison.

Similar arms 102 depend from the outer ends of the shafts 93 and 98 and their lower ends are connected by means of links 103 with the hubs of pulleys 76. In this manner a simultaneous movement is imparted to the pulleys 76 on their respective shafts 78. The depending arms 96 and 102 are of equal length and in consequence the surfacing belts 77 and their supporting pulleys 75 and 76 receive a like lateral movement which is at a right angle to the path of travel of the belts.

In the practical operation of the machine the belts 77 are driven at a speed to prevent the heating of varnish and shellac surfaces and insure a removal of the old finish without gumming and choking the belts and impairing their efficiency. The belts travel in the same direction at a uniform rate of speed and at the same time have a lateral reciprocatory movement imparted thereto which prevents scratching and insures a smooth finish to the floor or other surface under treatment. The machine advances in a path at a right angle to the travel of the finishing belt 77. When the machine reaches the limit of its travel in each direction it is automatically reversed by the means and in the manner herein specified.

In use, the machine is placed in one corner of a room, the motor started and the clutch 23 set to cause the tractors and surfacing belts to operate. The machine will then travel along one wall to the opposite side of the room, then along the side a distance equal to the width of the machine, and then back to the starting wall, continuing to follow a zigzag path until the entire floor has been treated. As shown in Figures 1 and 2, the clutch sleeve 23 is engaged with the gear 21 and the tractors are consequently being driven in such direction that the ma-

chine will travel to the left in Figure 2. As the machine reaches the left wall or other fixed object at the left side of the room, the bar 65 will come in contact therewith and will be pushed inward, thereby disengaging the gear 21 and engaging the gear 22 to effect reverse travel of the machine. The bar 64 is pushed inwardly simultaneously with the bar 65, thereby rocking the lever 61 and closing the clutch 60 which is always open when the machine is traveling on the tractors. When the clutch 60 is closed, the wheel 58 will be made active and will draw the bar 55 inward, rocking the arm 51 through the pawl 52 and transmitting the movement through the bars 47 and links 49 to the levers 43 and 45 which are thereupon rocked. The axles of the gears 41 and 42 are thus brought into vertical alinement on a line at a right angle to the floor and the rollers 44 and 46 made to bear upon the floor, thus elevating the machine sufficiently to make the tractors neutral. The rollers 44 and 46 will now bear the weight of the machine and as the rollers 44 are rotated the machine will travel in a direction at a right angle to its previous line of travel. When the bar 55 moves inwardly, the pawl 52 is eventually released by the lifter 67, as before described, but the pawl 53 remains in engagement with the catch 54 until the trip 66 releases it, as previously stated, the spring 59 being wound by the inward movement of the bar 55. The trip 66 acts at the same time that the knockout block 68 opens the clutch 60, whereupon the bar 55 returns to its initial position under the influence of the spring 59, the rollers 44 and 46 are raised, and the machine drops to be supported by the tractors and thereupon makes a return trip to the starting side of the room. The action of the bar 55 is so timed that the rollers 44 and 46 will move the machine a distance equal to its own width between the closing and opening of the clutch 60.

Having thus described the invention, I claim:

1. A floor surfacing machine comprising a frame, a power driven shaft thereon, tractor means mounted on the frame and operatively connected with the power shaft for propelling the machine, means mounted on the frame and operable by impact with a fixed object to reverse the direction of travel of the tractor means, and surfacing mechanism carried by the frame and deriving movement from the power driven shaft.

2. A surfacing machine comprising a frame, a power driven shaft thereon, tractor means carried by the frame and operated by said shaft for propelling the machine over the surface, cooperating reversing gears and a clutch interposed between the tractor means and the power driven shaft, a bar slidably mounted on the frame and projecting beyond the same, connections between said bar and the clutch whereby upon impact of the end of the bar against a fixed object the direction of travel will be reversed, and surfacing mechanism carried by the frame and deriving power from the positively driven shaft and operating in a direction transverse to the direction of travel of the tractor means.

3. In a floor surfacing machine including an endless surfacing belt, a fixed bar disposed between the runs of the surfacing belt, a pressure bar in contact with the active run of the surfacing belt, links disposed between and connected to the two bars, cross bars hinged together and also disposed between and secured to the two bars to maintain the pressure bar in determinate position, and spring means between the two bars for yieldably holding the pressure bar in contact with the active run of the surfacing belt.

4. A floor surfacing machine comprising a frame, tractor and surfacing mechanisms mounted thereon, lifting elements, means for lowering the lifting elements into contact with the surface to elevate the tractor and surfacing mechanisms, locking means for securing the lifting elements in lowered position, and means actuated by impact with a fixed object for tripping the locking means to admit of automatic return of the parts to normal position.

5. In a floor surfacing machine, a frame, tractor and surfacing mechanisms thereon, lifting elements, means for lowering the lifting elements to elevate the frame and tractor and surfacing mechanisms, means for returning the lifting elements to normal position, and other elements for engaging the surface and holding the frame in elevated position after the lifting elements have returned to normal position.

6. In a floor surfacing machine, the combination of a frame, tractor and surfacing mechanisms thereon, lifting elements, a bar for operating the lifting elements, a pawl carried by the operating bar and adapted to coact with a clutch for holding the lifting elements in operative position, and a spring actuated member operated by the bar to tension the spring which, when released, returns said bar to a given position.

7. In a floor surfacing machine, a frame, tractor and surfacing mechanisms thereon, lifting elements, a pivoted bar for operating the lifting elements, a toothed bar, pawls mounted upon the pivoted bar, one of the pawls being engageable with the toothed bar, a catch for engaging the other pawl to hold the lifting elements in lowered position, a lifter for disengaging the pawl from the toothed bar, means for releasing the pawl from the catch, and a spring actuated member having its spring tensioned by the inward movement of the toothed bar, whereby

to return it to normal position after the parts have been released.

8. In a floor surfacing machine, the combination of a frame, tractor and surfacing mechanisms thereon, lifting elements, a pivoted bar connected with the lifting elements to effect operation thereof, pawls mounted upon the pivoted bar, a toothed bar coacting with one of said pawls to move the lifting elements into operative position, a catch for engaging the other pawl to hold the lifting elements in lowered position, a spring gear wheel tensioned by movement of the toothed bar in one direction to return it to normal position when released, a lifter for disengaging the pawl from the toothed bar, and a trip carried by the toothed bar for disengaging the pawl from the said catch.

9. In a floor surfacing machine, the combination of a frame, tractor and surfacing mechanisms thereon, lifting elements, a pivoted bar connected with the lifting elements to effect operation thereof, pawls mounted upon the pivoted bar, a toothed bar coacting with one of said pawls to move the lifting elements into operative position, a catch for engaging the other pawl to hold the lifting elements in lowered position, a spring gear wheel tensioned by movement of the toothed bar in one direction to return it to normal position when released, a lifter for disengaging the pawl from the toothed bar, and a trip carried by the toothed bar for disengaging the pawl from the said catch, a bar mounted upon the toothed bar, coacting teeth between the two bars, a spring normally urging the bar in one direction and a stop for limiting the movement of the said bar.

In testimony whereof I affix my signature.

CHARLES J. OLSON. [L. S.]