Jan. 24, 1967 J. L. BURGOON 3,299,460

FLOOR CLEANING MACHINE

Filed Oct. 22, 1965 2 Sheets-Sheet 1

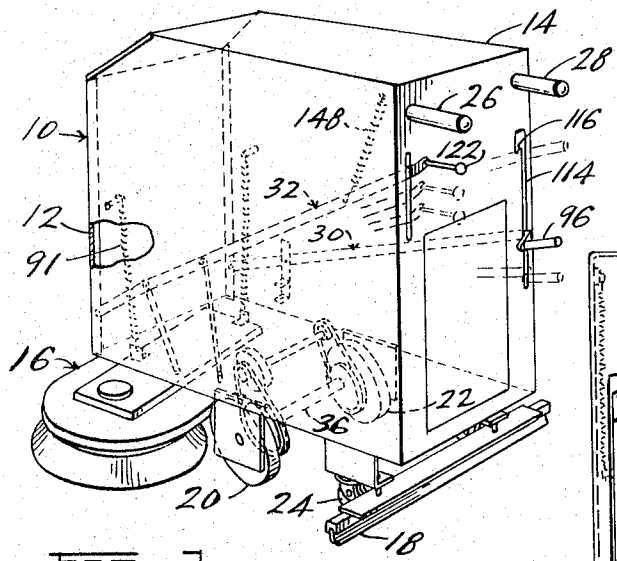


FIG-1-

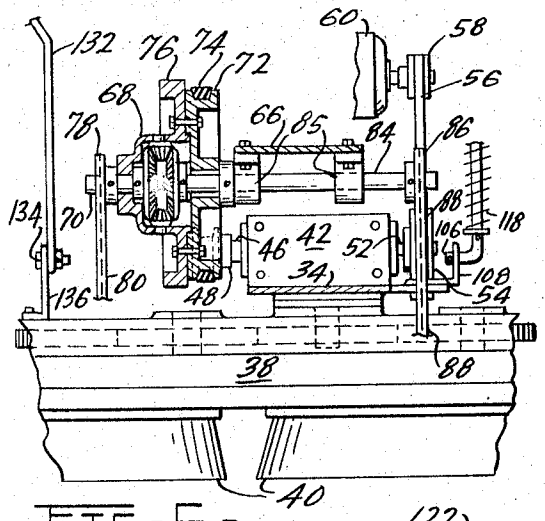


FIG-5-

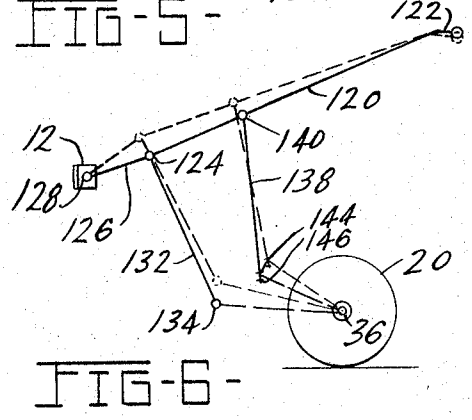


FIG-6-

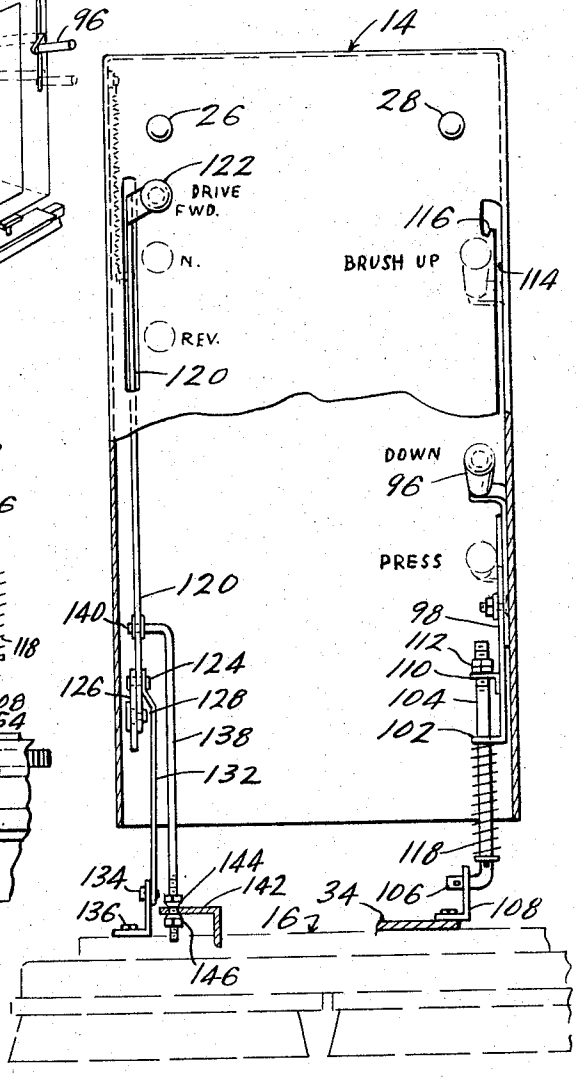


FIG-2-

INVENTOR:
JACK L. BURGOON.
BY
ATT'YS.

Jan. 24, 1967 J. L. BURGOON 3,299,460

FLOOR CLEANING MACHINE

Filed Oct. 22, 1965 2 Sheets-Sheet 2

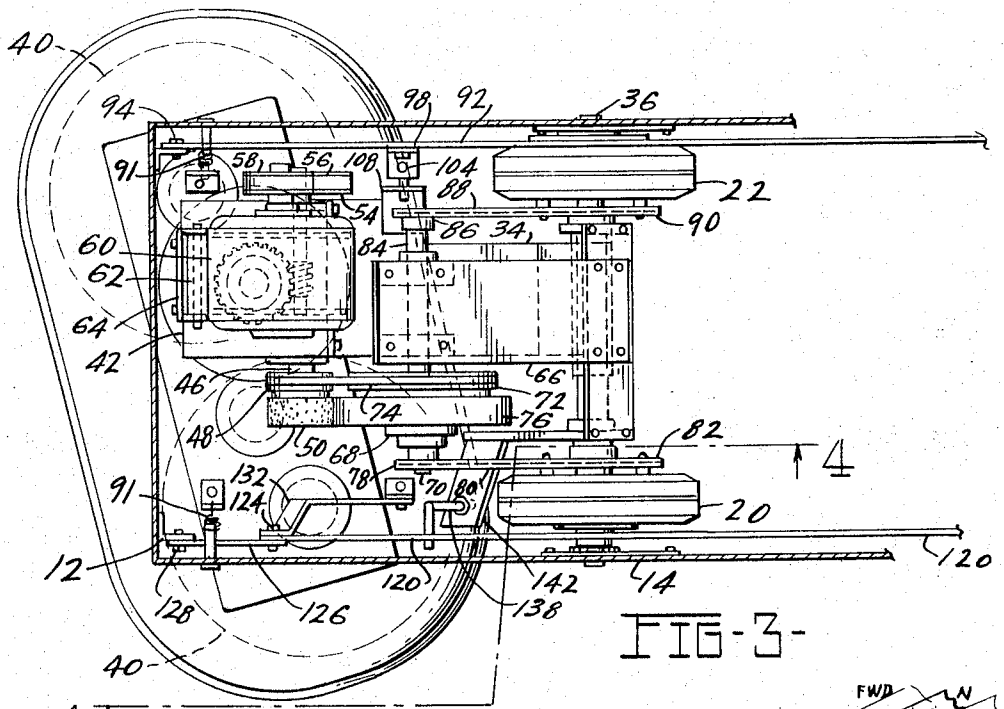


FIG-3-

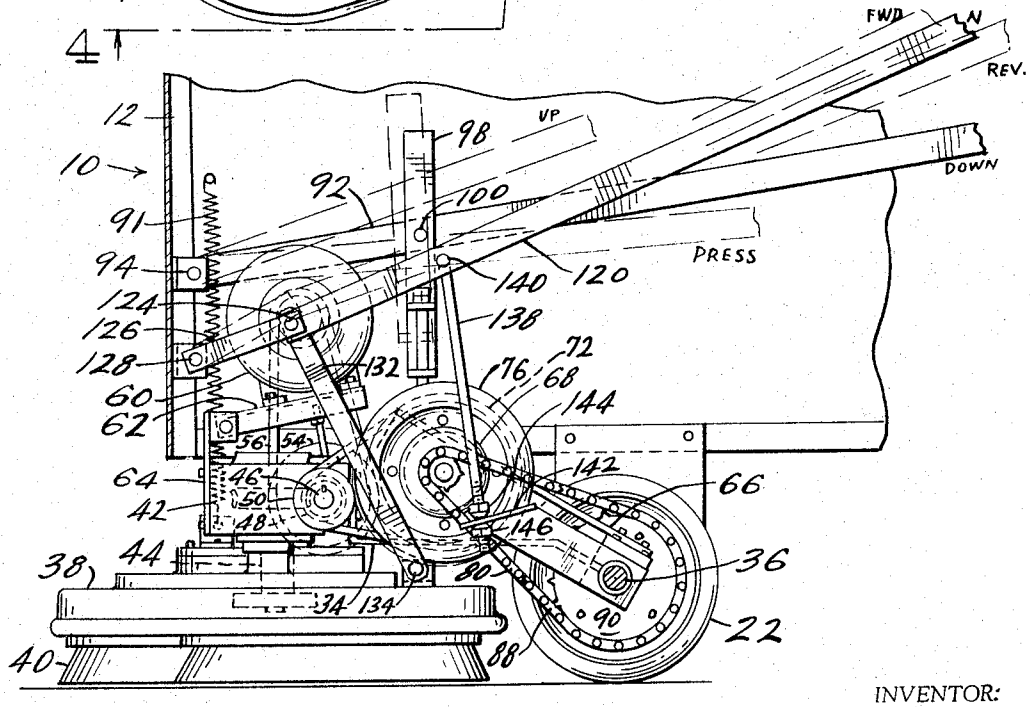


FIG-4-

INVENTOR:
JACK L. BURGOON
BY
ATT'YS.

United States Patent Office 3,299,460 Patented Jan. 24, 1967

3,299,460

FLOOR CLEANING MACHINE

Jack L. Burgoon, Toledo, Ohio, assignor to American-Lincoln Corporation, Toledo, Ohio, a corporation of Ohio

Filed Oct. 22, 1965, Ser. No. 501,208
8 Claims. (Cl. 15—49)

This invention relates to a machine for cleaning floors and more particularly to a floor scrubbing machine including a unique linkage arrangement for operating the machine.

Various floor scrubbing machines for cleaning large floor areas are now known in the art and continually find increasing use. A popular type of floor scrubbing machine is electrically operated and has cleaning or scrubbing brushes rotatably mounted at the front and a squeegee toward the rear for collecting and helping to remove water deposited on the floor at the scrubbing brushes. The machine is controlled by an operator walking behind it, with controls accessible at the rear of the machine for driving the machine, for rotating the scrubbing brushes, and for raising and lowering the scrubbing brushes, depending on whether the machine is being used for cleaning or is being transported to or from the area to be cleaned.

Heretofore, this type of scrubbing machine has been equipped with clutch means for connecting a drive motor and the wheels to move the scrubbing machine when desired and with additional means for raising and lowering the scrubbing brushes when desired. While the main reason for raising the brushes is to facilitate movement of the machine when being transported to and from the work site, it also is desirable at times to temporarily raise and lower the brushes during scrubbing to clear various floor obstacles. Heretofore, with a scrubbing machine of this type, when the mechanism for raising and lowering the scrubbing brushes has been operated, the clutch or shift mechanism also has been moved so as to disengage the wheels and drive motor whether the machine was driven forwardly or in reverse. This required re-shifting which constituted a substantial nuisance to the operator and, at times, substantially hampered the scrubbing operation.

The present invention relates to a scrubbing machine of the type described above which has a unique shifting linkage which does not change position and does not change the drive connection when the scrubbing brush unit is raised and lowered. Hence, the machine can be driven in a particular direction and the brush unit raised or lowered during travel to clear any obstacles, without interrupting the operation of the machine or requiring re-shifting. The constant position of the shifting linkage also contributes to the comfort of the operator, since the operator must continuously grip the shifting control during movement of the scrubbing machine.

It is, therefore, a principal object of the invention to provide a floor cleaning machine which can be moved forwardly or rearwardly while the scrubbing unit is being raised or lowered without interruption of the drive mechanism.

Another object of the invention is to provide a shift control for a floor cleaning machine which will not change position when a scrubbing unit of the machine is raised and lowered.

Other objects and advantages of the invention will be apparent from the following detailed description of a preferred embodiment thereof, reference being made to the accompanying drawings, in which:

FIG. 1 is a somewhat schematic, rear prespective view of a floor cleaning machine embodying the invention;

FIG. 2 is a rear view, with parts broken away, of the machine of FIG. 1 and showing lifting and shifting controls;

FIG. 3 is a view in horizontal cross section taken just above a scrubbing unit of the machine;

FIG. 4 is a left side view in elevation, with a wheel and part of the housing removed, of the scrubbing unit;

FIG. 5 is a fragmentary view in transverse cross section of part of the scrubbing unit; and

FIG. 6 is a diagrammatic view of clutch linkage, shown in solid lines when the scrubbing unit is lowered and in dotted lines when the unit is raised.

Referring to FIG. 1, a floor cleaning machine embodying the invention in indicated at **10** and includes a main frame **12**, a main housing **14**, a floor scrubbing or brush unit **16**, and a squeegee **18**. The machine is supported on main wheels **20** and **22** and casters **24** and steered by handles **26** and **28** located at the rear. A lifting linkage **30** is used to raise and lower the scrubbing unit **16** and a shifting linkage **32** causes engagement and dis-engagement of the main wheels **20** and **22**.

Referring more particularly to FIGS. 3 and 4, the scrubbing unit **16** includes a main support or bracket **34** pivotally mounted on an axle **36** for main wheels. A brush housing **38** is attached to the bracket **34** and also serves to provide a main suppport in combination with the bracket. A pair of scrubbing brushes **40** are rotatably mounted in the housing **38**, extending therebelow in the usual manner. The upper portion of the housing contains a gear train or other suitable means for driving the scrubbing brushes **40**, preferably in opposite directions. A gear box **42** is mounted on the housing **38** and encloses a worm and worm wheel or other suitable gear drive which is connected with the housing gear train for the brushes through a depending vertical shaft **44** (FIG. 4). The gear box **42** also includes a horizontally-extending output shaft **46** terminating in a drive pulley **48** and a friction wheel **50** for driving the main wheels **20** and **22** in forward and reverse directions. An input shaft **52** (FIG. 5) for the gear box **42** has a pulley **54** connected through a V-belt **56** to a drive pulley **58** of a motor **60**. The motor **60** is carried on an adjustable platform **62** (FIG. 4) supported above the housing **38** by a vertical bracket **64**.

A second support or bracket **66** (FIGS. 3 and 5) is also pivotally mounted on the axle **36** and pivots independently of the main bracket **34**. A differential **68** is carried by the second bracket and has a first countershaft **70** extending in the direction of the wheel **20**. A pulley **72** is mounted on the differential and is connected to the pulley **48** by a V-belt **74**. Adjacent the pulley **72** is a large cast iron wheel **76** which can engage the friction wheel **50** when pressed thereagainst to drive the main wheels in a direction opposite to that achieved when the pulleys **48** and **72** are connected. A drive sprocket **78** is mounted at the end of the shaft **70** and is connected bv a chain **80** to a driven sprocket **82** affixed to the wheel **20**. A second countershaft **84** extends from the opposite side of the differential and is rotatably supported by the bracket **66** through bearing blocks **85**. The shaft **84** drives the second wheel **22** through a drive sprocket **86** connected by a chain **88** to a second driven sprocket **90** affixed to the wheel **22**.

When the bracket **66** is raised, the V-belt drive is tightened and engaged and the wheels **20** and **22** are driven forwardly, assuming that the drive pulley **50** is driven in a counterclockwise direction, as shown in FIG. 4. When the bracket **66** is moved downwardly, the V-belt **74** becomes slack and the large wheel **76** frictionally engages the friction wheel **50** and causes the main wheels **20** and **22** to move the scrubbing machine rearwardly.

When the machine is to be transported to and from the job site, for example, and the floor over which it

travels is not being cleaned, the unit 16 is raised so that the brushes 40 will be clear of the floor. This is accomplished by the lifting linkage 30 with the aid of two counterbalance springs 91 which partially offset the weight of the motor and drive mechanism. The linkage 30 includes a main lever 92 pivoted by a fastener 94 to the frame 12 and has a handle 96 (FIG. 2) extending beyond the rear of the housing 14. A vertical link 98 is pivotally connected by a fastener 100 to the main lever 92 and has a horizontal leg 102 through which a lift rod 104 extends. The lift rod 104, in turn, has a connecting leg 106 which is connected to the main support by an ear 108. The link 98 also has an upper leg 110 engageable with adjustable stops or nuts 112 on the rod 104.

When the handle 96 is raised in a slot 114 in the rear panel of the housing and held in a notch 116, the upper leg 110 bears against the stops 112 and raises the lift rod 104 to raise the scrubbing unit 16, causing it to pivot around the axle 36. This raises the brushes 40 off the floor to facilitate transportation of the scrubbing machine. If more pressure is desired on the brushes during cleaning to remove particularly stubborn dirt, the handle 96 can be temporarily pushed downwardly wherein the lower leg 102 of the link 98 compresses a pressure spring 118 which places downward pressure on the rod 104 and increases pressure on the brush housing.

With previous machines, when the scrubbing unit has been pivoted around the axle, the clutch mechanism has become dis-engaged whether the machine is moving either forwardly or in reverse. Consequently, the clutch mechanism must be shifted again, which has been particularly undesirable when the brush unit is only temporarily raised during cleaning to clear a floor obstacle. However, in accordance with the invention, the shifting linkage 32 remains engaged when the brush unit is pivoted and, further, does not change position to any extent during such pivotal movement.

The clutch mechanism 32 includes a main link or lever 120 which extends beyond the rear of the housing 14 and terminates in a handle 122 (FIG. 2.) The main link 120 is pivotally connected by a pin 124 to a pivot link 126 which, in turn, is pivoted by a pivot pin 128 to the main frame 12. The pivot link 126 enables the main link 120 to pivot but not to move rearwardly. A first connecting or supporting link 132 is pivoted to the link 126 and the main link 120 by the pin 124 and is pivotally connected by a pin 134 to a suitable ear 136 mounted on the housing 38 in a fixed position relative to the main bracket 34. A second connecting or lifting link 138 is connected to an intermediate portion of the link 120, to the rear of the pin 124, by a pivot pin or leg 140. The link 138 is pivotally connected to the second bracket 66, in this instance extending through an opening in a bracket arm 142 and held by adjusting nuts 144 and 146.

With the particular arrangement of the linkages, when the scrubbing unit is raised, the handle 96 does not appreciably move but only changes angularly slightly as illustrated in FIG. 6. Of course, the particular arrangement of the links 120, 126, 132, and 138 will vary somewhat according to the particular machine, with these four links actually forming a six-bar linkage with additional links formed between the pivot pin 134 and the axle 36 and between the pivot joint of the link 138 and the axle 36, as represented by dashed lines in FIG. 6.

When the main link 120 is raised, regardless of whether the scrubbing unit is in the raised or lowered position, the second bracket 66 is raised relative to the main bracket 34, causing the differential and the countershaft 70 to tend to move away from the shaft 46. This places the V-belt 74 in tension and causes the pulley 72 to rotate with the drive pulley 48 when the motor is running. The wheels 20 and 22 then rotate forwardly in the same direction as the shaft 46.

When the link 120 is moved downwardly to a neutral position, where it tends to be held by a counter-spring 148, the second bracket 66 is moved downwardly relative to the bracket 34 and produces slack in the V-belt 74 to dis-engage the belt drive. When the link 120 is moved further downwardly beyond the neutral position, the wheel 76 then frictionally engages the friction wheel 50 to move the countershafts 70 and 84 in the opposite direction and cause the wheels 20 and 22 to move rearwardly. This operation can be achieved whether the scrubbing unit is in the raised or lowered position as the relative positions of the supports 34 and 66 do not change.

Various modifications of the above described embodiment of the invention will be apparent to those skilled in the art, and it is to be understood that such modifications can be made without departing from the scope of the invention, if they are within the spirit and the tenor of the accompanying claims.

I claim:

1. A floor cleaning machine comprising a main frame, an axle supported by said frame, a pair of main wheels on said axle and rotatable relative to said frame, a main support mounted on said axle and pivotable relative to said frame, said support extending forwardly, a second support pivotally mounted on said axle independently of said man support and extending forwardly above said main support, a scrubbing brush rotatably carried by said main support, said brush being engageable with the floor when said main support is in a lower position and said brush being spaced from the floor when said main support is pivoted to an upper position, a motor carried by said main support, a gear box mounted on said main support, means connecting said gear box and said motor, means connecting said gear box and said scrubbing brush to effect a drive between said brush and said motor, a countershaft rotatably carried on said second support, means connecting said countershaft and said wheels to rotate said wheels when said countershaft is rotated, means connecting said gear box and said countershaft to drive said countershaft and said wheels in one direction when said countershaft is moved with said second support in a direction away from said main support, and to drive said countershaft and said wheels in the opposite direction when said countershaft is moved toward said main support, lifting linkage connected to said main support and pivotally connected to said frame and extending rearwardly of said scrubber for moving said main support from a position in which said brush is engageable with the floor to a raised position in which said brush is spaced from the floor, shifting linkage for moving said second support and said countershaft in said directions and to an intermediate position regardless of the position of said main support, said shifting linkage including a main link extending beyond the rear of said scrubbing machine, a pivot link pivotally connected to the forward end of said main link and pivotally connected to a forward portion of said main frame, a connecting link pivotally connected to an intermediate portion of said main link and pivotally connected to said main support, and a second connecting link pivotally connected to an intermediate portion of said main link toward the rear of said scrubbing machine and pivotally connected to said second support, said second connecting link diverging from said first connecting link in a direction toward said supports from said main link, said main link, said pivot link, and said connecting links being of such lengths that the rear end of said main link remains substantially in a constant position when said main support is pivoted between its upper and lower positions.

2. A floor cleaning machine comprising a main frame, an axle supported by said frame, a pair of main wheels on said axle and rotatable relative to said frame, a main support mounted on said axle and pivotable relative to said frame, said support extending forwardly, a second support pivotally mounted on said axle independently of said main support and extending forwardly above said main support, a scrubbing brush rotatably carried by said

main support, said brush being engageable with the floor when said main support is in a lower position and said brush being spaced from the floor when said main support is pivoted to an upper position, a motor carried by said main support, a countershaft rotatably carried on said second support, means connecting said countershaft and said wheels to rotate said wheels when said countershaft is rotated, means to drive said counter shaft and said wheels in one direction when said countershaft is moved with said second support in a direction away from said main support, and to drive said countershaft and said wheels in the opposite direction when said countershaft is moved toward said main support, lifting linkage connected to said main support and pivotally connected to said frame and extending rearwardly of said scrubber for moving said main support from a position in which said brush is engageable with the floor to a raised position in which said brush is spaced from the floor, shifting linkage for moving said second support and said countershaft in said directions and to an intermediate position regardless of the position of said main support, said shifting linkage including a main link extending beyond the rear of said scrubbing machine, a pivot link pivotally connected to said main link and pivotally connected to said main frame, a connecting link pivotally connected to said main link and pivotally connected to said main support, and a second connecting link pivotally connected to said main link toward the rear of said scrubbing machine and pivotally connected to said second support, said main link, said pivot link, and said connecting links causing the rear end of said main link to remain substantially in a constant position when said main support is pivoted between its upper and lower positions.

3. A floor scrubbing machine comprising a main frame, an axle supported by said frame, a pair of main wheels on said axle and rotatable relative to said frame, a main support mounted on said axle and pivotable relative to said frame, said support extending forwardly, a second support pivotally mounted on said axle independently of said main support and extending forwardly above said main support, a scrubbing brush rotatably carried by said main support, said brush being engageable with the floor when said main support is in a lower position and said brush being spaced from the floor when said main support is pivoted to an upper position, a motor carried by said main support, a countershaft rotatably carried on said second support, means connecting said countershaft and said wheels to rotate said wheels when said countershaft is rotated, means to drive said countershaft and said wheels in one direction when said countershaft is moved with said second support in a direction away from said main support, and to drive said countershaft and said wheels in the opposite direction when said countershaft is moved toward said main support, lifting linkage connected to said main support and pivotally connected to said frame and extending rearwardly of said scrubber for moving said main support from a position in which said brush is engageable with the floor to a raised position in which said brush is spaced from the floor, shifting linkage for moving said second support and said countershaft in said directions and to an intermediate position regardless of the position of said main support, said shifting linkage including a main link pivotally connected to said main frame, connecting links connected between said main link and said supports, and resilient means urging said main link to the intermediate position.

4. A floor scrubbing machine comprising a main frame, an axle carried by said frame, wheels on said axle for supporting said frame, a main support pivotally mounted on said axle, a second support pivotally mounted on said axle independently of said main support, scrubbing brushes rotatably carried by said main support, a motor mounted on said main support, means connecting said brushes and said motor for rotating said brushes, a countershaft mounted on said second support, means connecting said countershaft and said main wheels to enable said main wheels to rotate with said countershaft, means connecting said countershaft and said motor to drive said countershaft and said wheels in one direction when said countershaft is moved transversely in a first direction, and for driving said countershaft and said wheels in the other direction when said countershaft is moved transversely in a second direction, a shifting linkage for moving said countershaft in said directions comprising a main link above said main support and extending beyond the rear of said scrubbing machine, a pivotal link pivotally connected to the forward end of said main link and pivotally connected to a front portion of said frame, a connecting link connecting an intermediate portion of said main link to said main support, and a second connecting link connecting an intermediate portion of said main link rearwardly of said first connecting link to said second support whereby when said supports are pivoted about said axle, the rear portion of said main link remains substantially stationary.

5. A floor scrubbing machine comprising a main frame, an axle carried by said frame, wheels on said axle for supporting said frame, a main support pivotally mounted on said axle, a second support pivotally mounted on said axle independently of said main support, scrubbing brushes rotatably carried by said main support, a motor mounted on said main support, means connecting said brushes and said motor for rotating said brushes, a countershaft mounted on said second support, means connecting said countershaft and said main wheels to enable said main wheels to rotate with said countershaft, means connecting said countershaft and said motor to drive said countershaft and said wheels in one direction when said countershaft is moved transversely in a first direction, and for driving said countershaft and said wheels in the other direction when said countershaft is moved transversely in a second direction, a shifting linkage for moving said countershaft in said directions comprising a main link above said main support and extending beyond the rear of said scrubbing machine, a pivotal link pivotally connected to the forward end of said main link and pivotally connected to a front portion of said frame, and connecting links connecting said main link and said supports, whereby when said supports are pivoted about said axle, the rear portion of said main link remains substantially stationary.

6. A floor scrubbing machine comprising a main frame, an axle supported by said frame, a main support mounted on said axle and pivotable relative to said frame, a second support pivotally mounted on said axle independently of said main support, scrubbing means carried by said main support, said scrubbing means being engageable with the floor when said main support is in a lower position and spaced from the floor when said main support is moved to an upper position, means associated with said main support and said second support for driving said scrubbing machine in a forward direction and in a reverse direction, said machine being driven in a rearward direction when said main support and said second support are moved toward one another and in a forward direction when said main support and said second support are moved away from one another, means for lifting said supports substantially simultaneously to move said scrubbing means off the floor, and shifting linkage for moving said second support toward and away from said main support, said shifting linkage including a main link extending beyond the rear of the scrubbing machine, a pivot link pivotally connecting a forward end of said main link and a forward portion of said main frame, a connecting link pivotally connected to the forward end of said main link and pivotally connected to said main support, and a second connecting link pivotally connected to an intermediate portion of said main link toward the rear of said machine and pivotally connected to said second support, said second connecting link diverging from said first connecting link in a direction toward said supports from said

main link, said main link, said pivot link, and said connecting links being of such lengths that the rear end of said main link remains substantially in a constant position when said main support and said second support are moved between the upper and lower positions.

7. A floor scrubbing machine comprising a main frame, a main support pivotable relative to said frame, a second support pivotable independently of said main support, scrubbing means carried by said main support, said scrubbing means being engageable with the floor when said main support is in a lower position and spaced from the floor when said main support is moved to an upper position, means associated with said main support and said second support for driving said scrubbing machine in a forward direction and in a reverse direction, said machine being driven in one direction when said main support and said second support are moved toward one another and in the opposite direction when said main support and said second support are moved away from one another, means for lifting said supports substantially simultaneously to move said scrubbing means off the floor, and shifting linkage for moving said second support toward and away from said main support regardless of the position of said supports relative to said frame, said shifting linkage including a main link extending beyond the rear of the scrubbing machine, a pivot link pivotally connecting a forward portion of said main link and said frame, a connecting link pivotally connected to a forward portion of said main link and pivotally connected to said main support, and a second connecting link pivotally connected to an intermediate portion of said main link toward the rear of said machine and pivotally connected to said second support, whereby said main link, said pivot link, and said connecting links cause the rear end of said main link to remain substantially constant when said main support and said second support are moved between the upper and lower positions.

8. A floor scrubbing machine comprising a main frame, a main support movable relative to said frame, a second support movable independently of said main support, scrubbing means carried by said main support, said scrubbing means being engageable with the floor when said main support is in a lower position and spaced from the floor when said main support is moved to an upper position, means associated with said main support and said second support for driving said scrubbing machine in a forward direction and in a reverse direction, said machine being driven in one direction when said main support and said second support are moved toward one another and in the opposite direction when said main support and said second support are moved away from one another, means for lifting said supports substantially simultaneously to move said scrubbing means off the floor, and shifting linkage for moving said second support toward and away from said main support, said shifting linkage including a main link extending beyond the rear of the scrubbing machine, means pivotally connecting a portion of said main link and said frame, a connecting link connected to said main link and said main support, and a second connecting link connected to a portion of said main link and said second support.

References Cited by the Examiner

UNITED STATES PATENTS

2,317,843	4/1943	Backlund	15—50
2,969,557	1/1961	Petersen	15—50
2,978,719	4/1961	Arones	15—50 X

CHARLES A. WILLMUTH, *Primary Examiner.*

E. L. ROBERTS, *Assistant Examiner.*