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Warren et al.

[11] **3,921,244**

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[54] **FLOOR BUFFER**

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[52] **U.S. Cl.** ..... **15/98;** 15/49 R; 51/177

[51] **Int. Cl.²** **A47L 11/162**

[58] **Field of Search** ..... 15/49 R, 49 C, 50 R, 50 C, 15/51, 52, 98, 385; 51/177; 125/38; 123/27

[56] **References Cited**

UNITED STATES PATENTS

1,829,132	10/1931	Finnell	15/50 R
1,847,323	3/1932	Yutzler et al.	15/49 R
2,079,946	5/1937	Myers	15/49 R
2,618,798	11/1952	Ohrt	15/50 R
3,098,329	7/1963	Doran	51/177
3,443,551	5/1969	Laubach	123/27

FOREIGN PATENTS OR APPLICATIONS

401,579	1/1969	Australia	15/49 R

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[57] **ABSTRACT**

An improved floor buffer for operator directed polishing of a floor is disclosed. A carriage disposed substantially horizontal to the floor has a lower surface exposed to the floor and an upper surface exposed away from the floor. A handle is attached to one end of the carriage. The handle extends angularly upward and away from the carriage toward the operator overlying an axis extending longitudinally of and from the carriage. At least two wheels are rotatably mounted to the carriage. These wheels are mounted along an axis extending transverse of or across the carriage substantially normal to the longitudinal axis of the carriage. The axis about which the wheels rotate divides the carriage into a forward portion and a rearward portion. A clockwise rotating buffer is rotatably mounted about a vertical axis preferably displaced to the right of the longitudinal axis of the carriage at the forward portion of the carriage and extends below the lower surface of the carriage to confront the floor. The buffer extends a distance below the lower surface of the carriage which is substantially the same as the distance of the lowest point of the wheels below the carriage. Downward and upward rotation of the rearward portion of the carriage by correspondent handle movement produces correspondent upward and downward confrontation of the buffer to the floor. A butane powered engine is mounted to the upper surface of the carriage. Power is transmitted from the butane engine to rotate the buffer. The power transmission includes a centrifugal clutch and belt drive for permitting the buffer to rotate or not rotate responsive to the speed of the motor.

2 Claims, 8 Drawing Figures

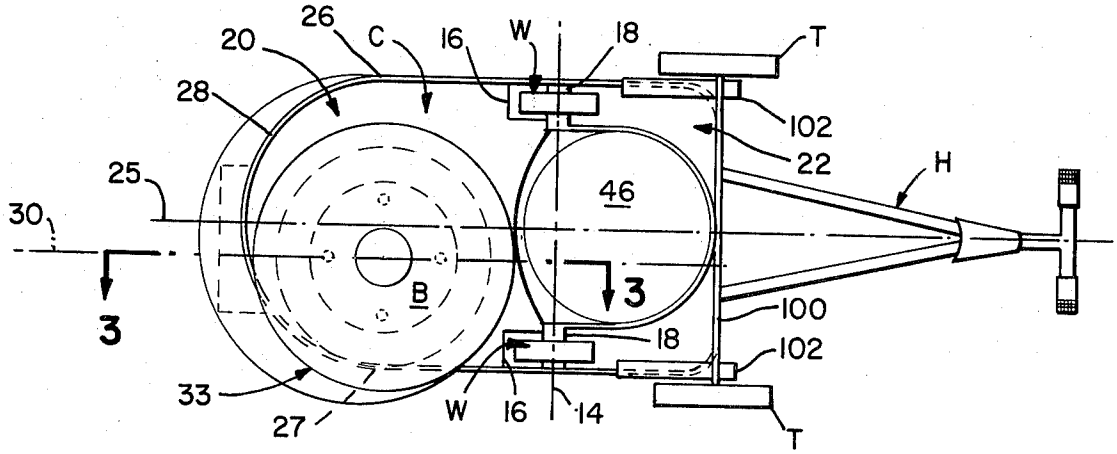
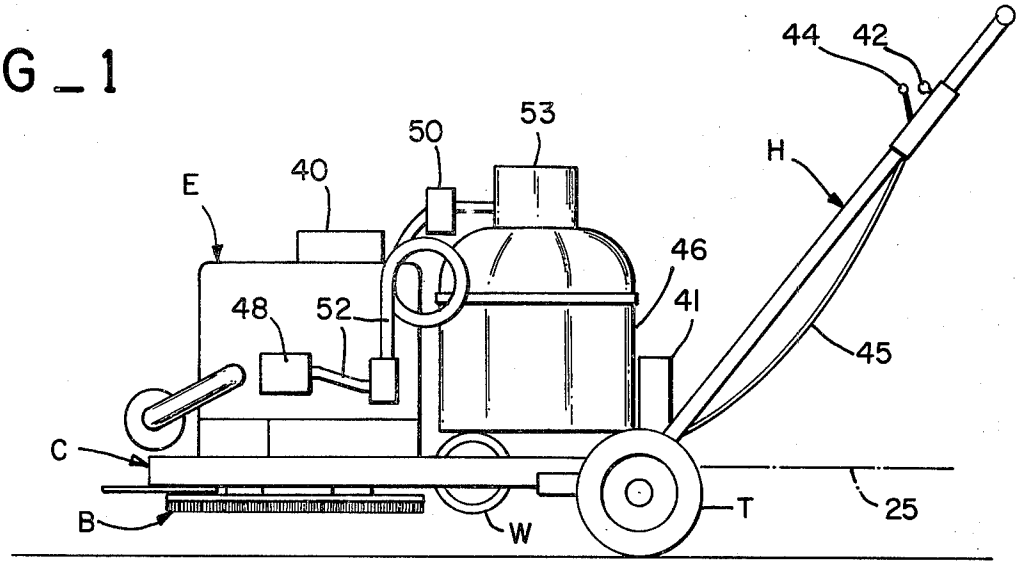


FIG_1



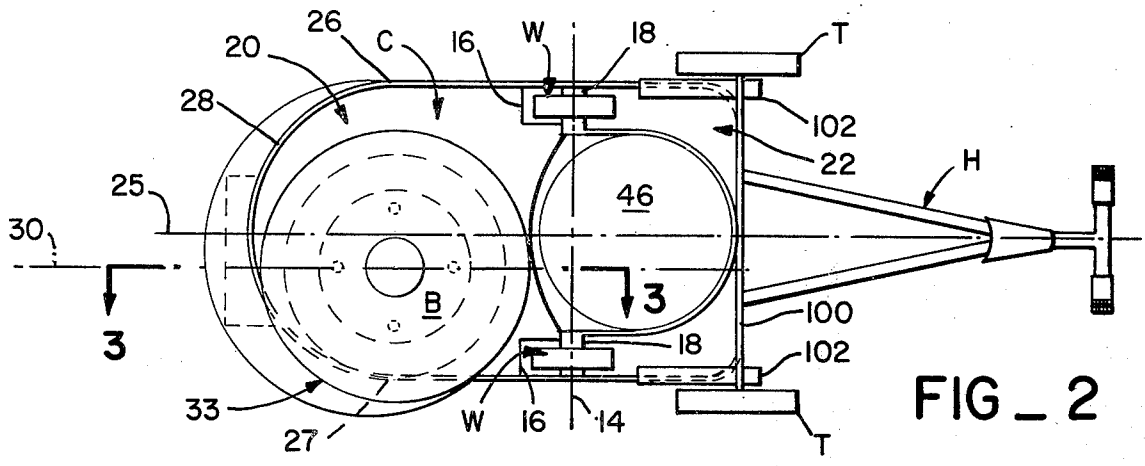


FIG_2

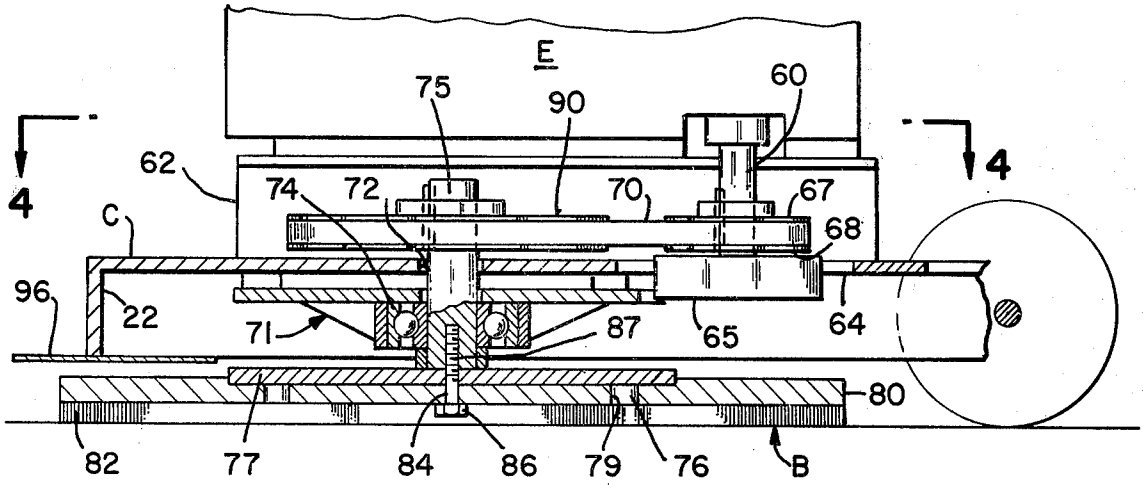


FIG_3

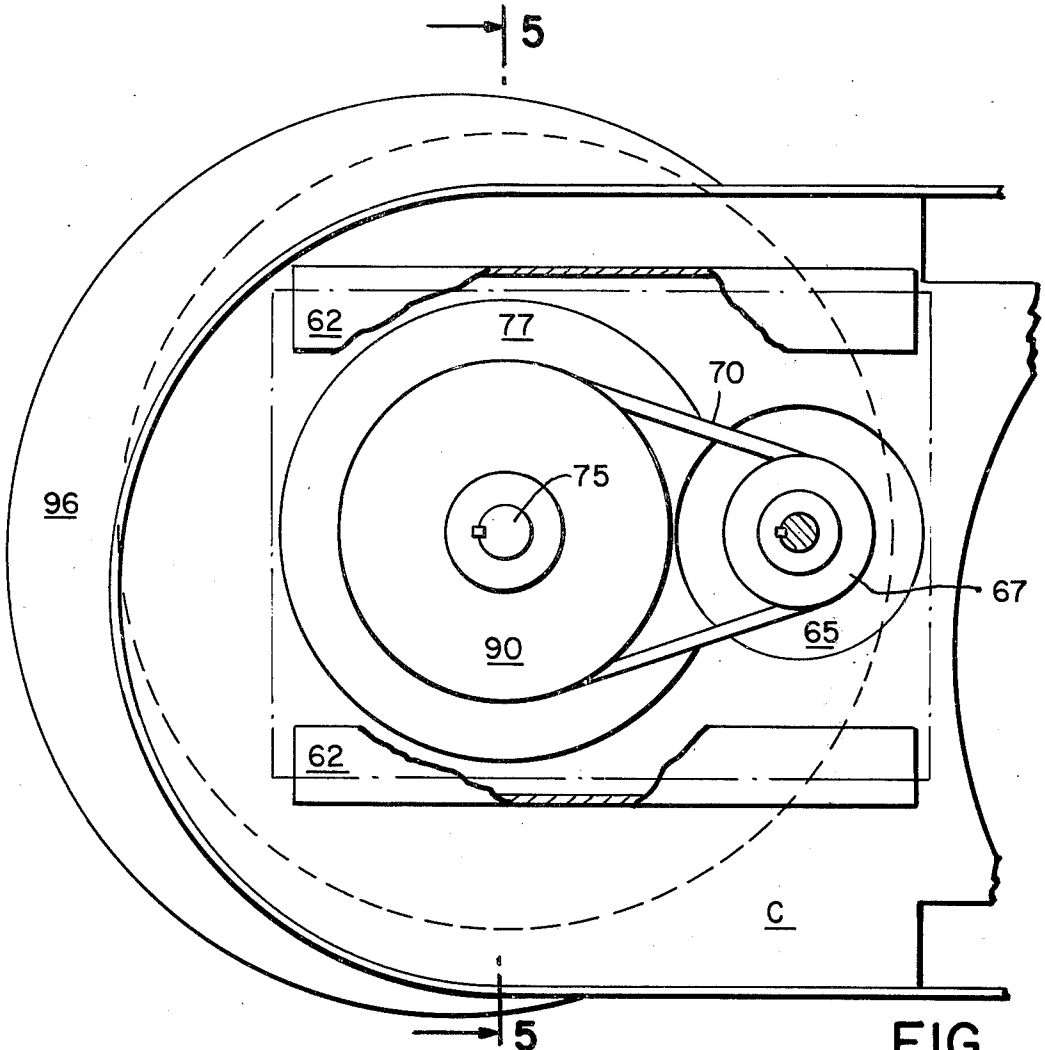


FIG_4

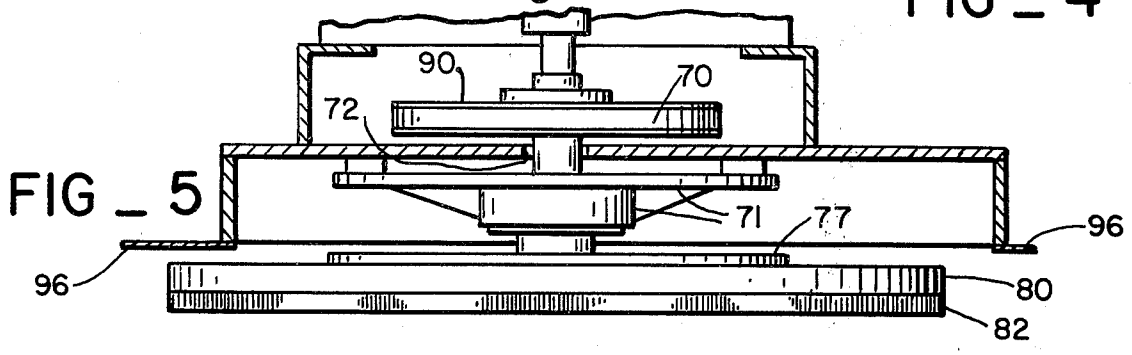


FIG_5

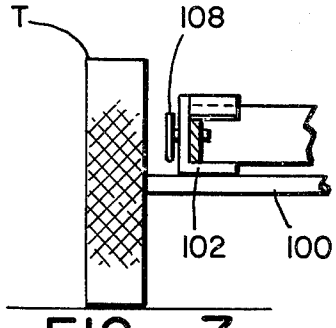


FIG_7

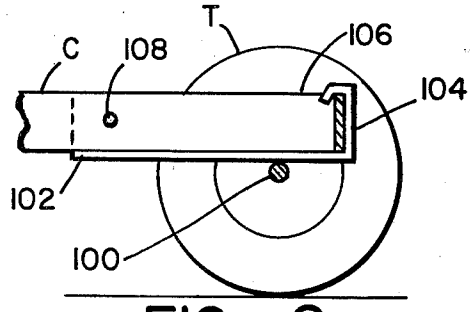


FIG_8

FLOOR BUFFER

This invention relates to buffers and specifically relates to a butane powered internal combustion engine driven buffer which is suitable for operator directed polishing of floors.

SUMMARY OF THE PRIOR ART

Heretofore, the power buffing of large interior floor areas of buildings such as supermarkets, department stores, and the like has been accomplished by electrically powered buffers. These electrically powered buffers have included many serious disadvantages.

First, the weight to horse power ratio of electric buffers is high. As a result, an electric buffer of relatively low power is extremely heavy.

Second, as electric buffers have low power, they drive the rotating buffer at correspondent low speed. More time is required for the buffer to scrub or polish a given unit of floor area.

Finally, electric powered buffers are typically dependent upon an electrical power source by means of a cord. Any type of cord aroung high speed rotating equipment is dangerous. Entanglement of the cord in either the operator, the rotating buffer, or both is mechanically or electrically dangerous. The cord is mechanically dangerous in that operator injury or cord injury can result through entanglement. The cord is electrically dangerous in that breaking of the cord and release electrical energy to injure the buffer, the power source or operator.

It should be noted in describing the prior art that known electrical buffers powering 18-inch diameter buffers in contact with the floor typically rotate at a speed of 150 rpm.

SUMMARY OF THE INVENTION

An improved floor buffer for operator directed polishing of a floor is disclosed. A buffer carriage is disposed substantially horizontally to the floor being polished and has a lower surface exposed to the floor and an upper surface exposed away from the floor. A handle is attached to the carriage. The handle extends angularly upward and away from the carriage toward the operator overlying a longitudinal axis along the carriage. At least two wheels are rotatably mounted to the carriage. These wheels are mounted for rotation about an axis transverse of the carriage substantially normal to the longitudinal axis of the carriage. The axis along which the wheels are mounted divides the carriage into a forward portion and a rearward portion. A clockwise rotating buffer is mounted to the carriage for rotation about the vertical axis at the forward portion of the carriage, preferably displaced to the right of the longitudinal axis of the carriage. This buffer extends below the lower surface of the carriage to confront the floor. The buffer confronts the floor below the lower surface of the carriage which is substantially the same as the distance of the powest point of the wheels below the carriage. Downward and upward rotation of the rearward portion of the carriage by the handle produces correspondent upward and downward adjustable confrontation of the buffer to the floor at varying pressures. A butane powered engine is mounted to the upper surface of the carriage. A transmission between the butane powered engine and the buffer including a centrifugal clutch and belt permits the buffer, when in contact with the floor, not to rotate at low operating speeds of the engine, to rotate at high operating speeds of the engine, and to operate at adjustable speeds between the low operating speed and the high operating speed of the motor.

Further Objects and Advantages of the Invention

An object of this invention is to disclose a buffer driven by a butane powered internal combustion engine.

An advantage of the butane internal combustion engine power source is that the weight to horse power ratio can be substantially reduced. As compared to prior art buffers, an 18-inch diameter buffer can be powered to rotate at a speed of 1,800 rpm.

Yet another advantage of the disclosed invention is that the buffer cuts working time of an electric buffer in polishing a unit floor area by at least two thirds.

An additional advantage of the butane powered internal combustion engine is that emissions nor harmful to human beings in enclosed areas are the output of a butane engine. Accordingly, it can be freely used in enclosed buildings such as supermarkets, department stores and the like.

A further advantage of the butane power source of this buffer is that it is not dependent upon any type of a cord. Correspondingly, entanglement hazards and electrical shock hazards are reduced.

A further object of this invention is to disclose a buffer mount which is eccentric with respect to a longitudinal axis of the carriage. Preferably, the buffer is driven for clockwise rotation as in confronts the floor. The buffer is offset to the right of the longitudinal axis defined by the handle mounted to the carriage.

An advantage of this eccentric rotation of the buffer is that the buffer can protrude to the side of the carriage and thus penetrate under counter kick plates. Thus, the entirety of the floor, including the under counter kick plate area, can be polished.

Yet another advantage of this invention is that the mounting of the buffer to the left coupled with the nonsymmetric weight distribution on the buffer gives an optimum reaction. This optimum reaction between the weight of the buffer, the support of the carriage and buffer at the carriage wheels, and the torque produced by the buffer contact on the floor, provides for an even movement of the buffer over the floor without the torque of the buffer tending to translate the buffering apparatus to one side or another side.

A further object of this invention is to disclose a centrifugal clutch belt drive for an internal combustion engine powered buffer.

An advantage of the centrifugal clutch drive is that the buffer can be stopped without turning off and restarting the motor.

A further advantage of the centrifugal clutch drive is that the speed of the buffer is adjusted for all buffing situations. The buffer can be stopped, slowed, or operated at full speed responsive to corresponding speed changes at the motor.

A further advantage of the clutch drive is that the only part incurring substantial wear —a V-belt— can be changed through the bottom of the buffer without disassembly of the machine.

A further object of this invention is to disclose a geometry of the carriage which can be satisfactorily used with an internal combustion engine drive. Specifically, the carriage is mounted at wheels which provide both a

means of transporting the carriage as well as a fulcrum between the buffer on one side, and the operator on the other side.

An advantage of the wheel fulcrum provided by this invention is the downward weight at the handle is easily exerted by the operator to raise and lower the buffer from the floor.

A further advantage of this arrangement is that by the expedient of locating the fuel tank over the fulcrum provided by the carriage wheels, variation of the fuel weight has little or no effect of the weight on the buffer.

Yet another advantage of this invention is that the two wheel fulcrum preferably used in this invention provides ease of moving the buffer to virtually all operating positions.

A further object of this invention is to disclose a pair of removable transport casters for transporting the buffer assembly to and from the floor upon which it works.

An advantage of the removable casters is that the buffer is rendered easy to transport. Moves such as up and down stairs and truck loading can easily be made with the entire unit.

A further advantage of this invention is that the transport casters are easily removable by a single person.

These and other objects and advantages of the invention will be more apparent after referring to the following specification and attached drawings in which:

FIG. **1** is a side elevation of the buffer of this invention;

FIG. **2** is a bottom plan of the buffer of this invention;

FIG. **3** is an enlarged side elevation section of the improved buffer at the buffing apparatus along lines **3—3** of FIG. **2;**

FIG. **4** is a top plan section of the buffer in the scale of FIG. **3** along lines **4—4** of FIG. **3;**

FIG. **5** is a side elevation section of the buffer along lines **5—5** of FIG. **4** also in the scale of FIG. **3;** and,

FIGS. **6** and **7** are details illustrating the removable transport casters shown attached to the invention in FIGS. **1** and **2.**

Referring to FIGS. **1** and **2,** carriage C having two fulcrum mounted wheels W is illustrated. Buffer B driven by butane powered engine E is attached to the carriage forward of wheels W. Variable speed of engine E as well as positioning of buffer B to and from confrontation with the floor is provided by controls on the end of handle H. Removable transport casters T used to transport the buffing apparatus to and from a work site are shown.

In operation, the buffer is moved to the work site with transport wheels T attached. At the work site, transport wheels T are removed. Engine E is started through control H to rotate the buffer B. By simultaneously balancing and transporting carriage C on wheels W, the buffer B can be moved in polishing confrontation rapidly over a floor.

Referring to FIGS. **1** and **2,** and in particular to FIG. **2,** the construction of carriage C can be illustrated. Broadly, carriage C is constructed of steel and has an overall rectangular shape. It is most convenient to describe carriage C in terms of functional axes which are defined transversely and longitudinally of the carriage.

Carriage C includes a transverse axis **14.** Axis **14** is the axis about which wheels W rotate. Two wheels W are hereshown mounted in apertures **16** extending through the carriage at and about shafts **18** on transverse axis **14.**

Realizing that during a buffing operation transport wheel T will be removed, it will be seen that carriage C is divided in forward portion **20** forward of axis **14** and in after portion **22** behind axis **14.**

Moreover, it will be seen that when transport wheels T are removed, the apparatus of this invention rests upon the three point stance provided by buffer B and the two wheels W. Pivoting of the carriage C about the wheels W is possible. Downward movement of handle H will pivot the buffer B upwardly and away from polishing confrontation with the floor to be polished. Conversely, upward movement of handle H will pivot the buffer B downward and into firm polishing confrontation with the floor.

Second axis **25** extends longitudinally of the buffer. As can be seen, it is equidistant between the respective side edges **26, 27** of carriage C.

The leading edge of forward portion **20** of carriage C is semicircular comprising preferably half a circle. This circular shape conforms to a circle having a diameter equal to the width of carriage C and gives the forward edge of the buffing apparatus a rounded profile wherein maximum penetration of the buffer to counter kick plate, counter edges, and walls may be obtained.

The edge of carriage C is typically provided with a depending skirt **22.** This skirt **22** gives the otherwise flat surface of the carrriage structural strength.

Referring to the bottom plan view of FIG. **2,** an aspect of the invention will be noted that may not be immediately apparent. Buffer B is eccentrically mounted with respect to longitudinal center line **25** along eccentric longitudinal center line **30.** This eccentric mount of the axis of the rotating buffer B provides two functions.

First, buffer B is set eccentrically so that at its rotating side edge **33,** it may penetrate underneath counter kick plates and the like as well as making a maximum penetration to walls which may define floor edges. It can thus be seen that the buffer can be moved along the edge of a wall leaving little or no unpolished floor between the space where the wall ends on one hand, and the floor begins on the other hand.

Second, buffer B is typically rotated in a clockwise direction as viewed from the position of the operator overlying the buffer. As viewed in the bottom plan view of FIG. **2,** the rotation of the buffer would appear to be counter clockwise.

It has been found with a clockwise rotating buffer eccentrically offset to the right, that the torque of the buffer in contact with the floor produces minimum bias against the handle H. Stated in other terms, the buffer had its tendency to turn the carriage C and everything there attached to one side or the other side minimized with the offset hereshown.

Understanding the configuration of the carriage C and the eccentric mounting of the buffer B, the drive of the buffer relative to the carriage can now be set forth.

Buffer B is typically an 18-inch diameter buffer provided with a steel wool bottom. The design speed of the buffer is such that high speed rotation in the range of 1,200 rpm can be expected. It has been found to be extremely important that buffer B be balanced before attachment as conventional balancing techniques well known to those skilled in the art can be applied, balancing of buffer B will not be discussed further herein.

Referring to FIG. **1,** engine E typically comprises a Briggs and Stratton 8 horsepower air-cooled engine. Typically, this engine E is converted for butane operation and includes an electric starter **40** powered by a

battery 41, the starter being activated by an ignition key 42 mounted to handle H. Speed control of engine E is provided by a conventional throttle 44 and connected throttle cable 45 to the engine E.

Engine E is mounted to carriage C at pair L sectioned brackets 62. Brackets 62 support engine E at a preselected distance above carriage C where motor shaft 60 can be disposed in a convenient buffer driving disposition.

A butane supply in the form of a cylindrical tank 46 is carried on carriage C. Tank 46 is typically mounted with its center of gravity substantially on axis 14 and with its center of gravity on the symmetric longitudinal axis 25 of carriage C.

Tank 46 supplies butane to the carburetor 48 of engine E. This occurs through a shut-off valve 50, a pressure regulator 53, and piping 52 to carburetor 48. It has been found preferable to turn engine E on and off by opening and closing shut-off valve 50. Additionally, operation of a manual control at pressure regulation valve 53 can limit fuel to and from engine E.

Having set forth the general configuration of carriage C, the eccentric location of buffer B and the general operating characteristic of the butane powered engine E, attention may now be directed to the detailed construction and drive of the buffer B as illustrated with respect to the enlarged sectional views of FIGS. 3, 4 and 5.

Drive shaft 60 of engine E is shown in FIG. 3 extending downwardly from motor mount 62 through aperture 64 in carriage C. At the bottom end of drive shaft 60 there is affixed centrifugal clutch 65. Centrifugal clutch 65 is a Heavy Duty Commercial Industrial Clutch manufactured by Comet Industries of Richmond, Indiana. In operation, this clutch with increased speed urges opposing pulley sections 67, 68 into increasing contact with a V-belt 70. Thus, in driving buffer B, increased engine speed produces increased pressure on V-belt 70 with resultant increased power transmission to buffer B.

Aperture 64 in carriage C privides an advantage that is not immediately apparent. This aperture 64 is sized so that removal and replacement of belt 70 can occur without machine disassembly.

Referring to FIGS. 3, 4 and 5, the mounting of buffer B to carriage C may not be described. Typically, conventional bearing housing 71 is mounted to the underside of carriage C below an aperture 72 through the carriage. A bearing 74 carried within the bearing housing has shaft 75 mounted within it. Shaft 75, at its lower end, has balanced disk 77. Disk 77 includes a series of pawls 76 protruding downwardly from it. Pawls 76 penetrate into corresponding apertures 79 on the surface of masonite disk 80 to which the polishing surface 82 of the buffer is mounted. Typically, disk 80 has central aperture 84 therein. Aperture 84 is pierced by bolt 86 which is threaded into threaded aperture 87 at the lower end of shaft 75.

Attachment of rotating disk 80 to the buffer can be readily understood. By registering four pawls 76 overlying four complementary apertures 79 in disk 80, disk 80 may be confronted to balanced disk 77 attached to the bottom of shaft 75. Thereafter, the tightening of bolt 86 can be used to urge and maintain masonite disk 80 in contact with the rotating and balanced disk 77, thereby transferring any rotation of shaft 75 firmly and positively to buffer B.

As can be seen, shaft 75 extends upwardly and above the upper surface of carriage C. At this juncture, there is affixed pulley 90. Pulley 90 is keyed to shaft 75 so that rotation of the pulley 90 produces correspondent rotation of buffer B. It will be apparent that a speed reduction from centrifugal clutch driven pulley sections 67, 68 to the buffer pulley 90 results. This speed reduction is in the order of one half. In any event, pulley sizing from the motor on one hand, to the buffer on the other hand, is designed to rotate the buffer at an approximate speed of 1,200 rpm, when the motor is operating at full throttle.

In the interstitial area between the bottom of the carriage C and the upper rotating surface of the buffer B, it is desirable to place guard 96. Guard 96 functions as a safety mechanism to prevent the operator or object from becoming entangled between the high speed rotating buffer on one hand, and the carriage underside on the other hand. Additionally, guard 96 serves as a splash plate. Assuming that the buffer of this invention is used for scrubbing and the like with water, splashing may be strictly confined to the buffer vicinity and prevent it from flying upwardly where surrounding counters, walls and the like may become unnecessarily soiled.

Having set forth the full construction of the buffer itself, attention may now be directed to removable transport wheels T as fully shown in FIGS. 1, 2, 6 and 7.

Referring to FIG. 2, transport wheels T are each rotatably mounted at opposite ends of a shaft 100. Shaft 100 has affixed thereto two angle bars 102.

Referring to the views of FIGS. 6 and 7, the function of the angle bars in fastening the transport casters T to the carriage C can be illustrated. Typically, angle bars 102 are each spaced on either side of shaft 100 so as to accommodate the width of carriage C snugly therebetween. The rearward edge of angle bar 102 at 104 is bent upwardly and thereafter draped over the end of the carriage C at lip 106.

The forward end of the angle bar 102 is held to the carriage C be means of pin 108. Pin 108 penetrates through corresponding complementary apertures in the side of the angle bar and in the side of the carriage.

Attachment and removal of the transport casters T can be easily understood. Typically, angle bars 102 are placed along opposite sides of the carriage C so as to snugly receive the carriage therebetween. Thereafter, angle bars 102 at lip 106 are rotated over an edge of the carriage C and rotated clockwise in the view of FIG. 7 upwardly and under the carriage C. When the aperture in angle bar 102 is registered with a correspondent aperture in the carriage C, pin 108 is inserted. The transport casters T thus become fastened to the carriage C permitting transport of the buffer to and from a floor where it is used.

It should be apparent to those skilled in this art that this invention will admit of a number of other embodiments. For example, by offsetting the buffer to the left and changing the direction of buffer rotation from clockwise to counter clockwise, the desirable torque characteristic hereinbefore explained can be achieved. Likewise, other transmissions for transmitting the power of the engine to the buffer can be used so long as variable power can be transmitted to the buffer with variable engine speed, and so long as when the engine is idling and buffer B is in contact with the floor, all rotation of the buffer ceases. Likewise, other modifica-

tions can be made to this invention without departing from the spirit and scope thereof.

We claim:

1. An improved floor buffer for operator directed polishing of a floor comprising: a carriage disposed substantially horizontally to said floor having a lower surface exposed to said floor and an upper surface exposed away from said floor; a handle attached to said carriage at the end of said carriage extending angularly upward and away from said carriage toward said operator overlying a longitudinal axis along said carriage; at least two wheels rotatably mounted to said carriage along an axis transverse of said carriage substantially normal to the longitudinal axis of said handle, said axis along which said wheels are mounted dividing said carriage into a forward portion and a rearward portion; a buffer mounted to said carriage for rotation about a vertical axis at said forward portion and extending below said lower surface to confront said floor, said buffer extending a distance below said lower surface of said carriage which is substantially the same as the distance of the lowest point of said wheels below said carriage whereby downward and upward rotation of the rearward portion of said carriage by said handle produces correspondent upward and downward confrontation of said buffer to said floor, said buffer being displaced to the right of said longitudinal axis as viewed from positions overlying said buffer and said floor, and said buffer rotates clockwise as viewed from positions overlying said buffer and said floor; a butane powered engine mounted to said carriage; means for transmitting power from said butane powered engine to said buffer, said power transmission means including a centrifugal clutch for permitting said buffer when in contact with said floor to not rotate at low operating speeds of said engine, to rotate at high operating speeds of said engine, and to operate at adjustable speeds between said low operating speeds and said high operating speed of said engine.

2. An improved floor buffer for operator directed polishing of a floor comprising: a carriage disposed substantially horizontally to said floor having a lower surface exposed to said floor and an upper surface exposed away from said floor; a handle attached to said carriage at the end of said carriage extending angularly upward and away from said carriage toward said operator overlying a longitudinal axis along said carriage; at least two wheels rotatably mounted to said carriage along an axis transverse of said carriage substantially normal to the longitudinal axis of said handle, said axis along which said wheels are mounted dividing said carriage into a forward portion and a rearward portion; a buffer mounted to said carriage for rotation about a vertical axis at said forward portion and extending below said lower surface to confront said floor, said buffer extending a distance below said lower surface of said carriage which is substantially the same as the distance of the lowest point of said wheels below said carriage whereby downward and upward rotation of the rearward portion of said carriage by said handle produces correspondent upward and downward confrontation of said buffer to said floor, said buffer being displaced to the left of said longitudinal center line as viewed from positions overlying said buffer and said floor, and said rotation of said buffer is counter clockwise as viewed from positions overlying said buffer and overlying said floor; a butane powered engine mounted to said carriage; means for transmitting power from said butane powered engine to said buffer, said power transmission means including a centrifugal clutch for permitting said buffer when in contact with said floor to not rotate at low operating speeds of said engine, to rotate at high operating speeds of said engine, and to operate at adjustable speeds between said low operating speed and said high operating speed of said engine.

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