Sept. 28, 1943. Q. BERG 2,330,665

SUCTION CLEANER

Filed May 4, 1942 2 Sheets-Sheet 1

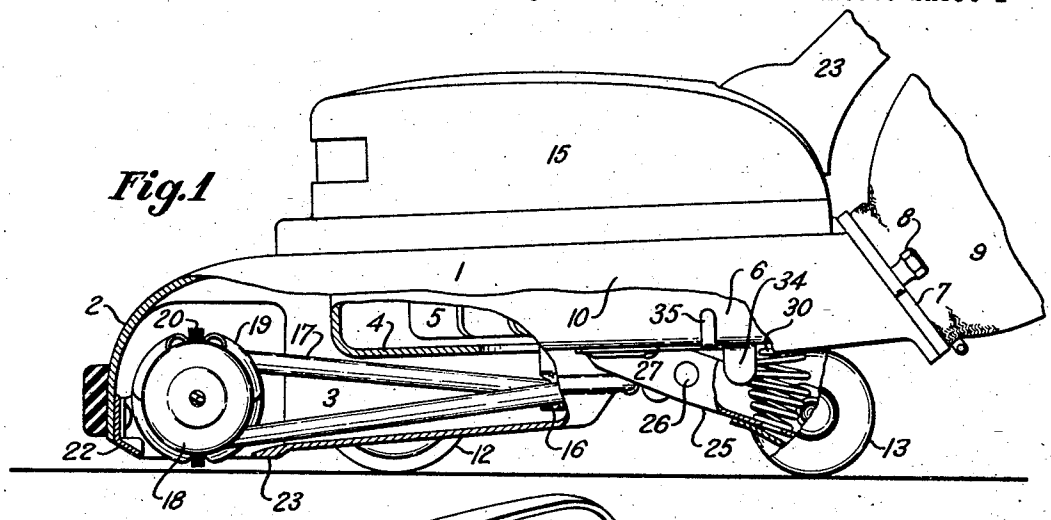


Fig.1

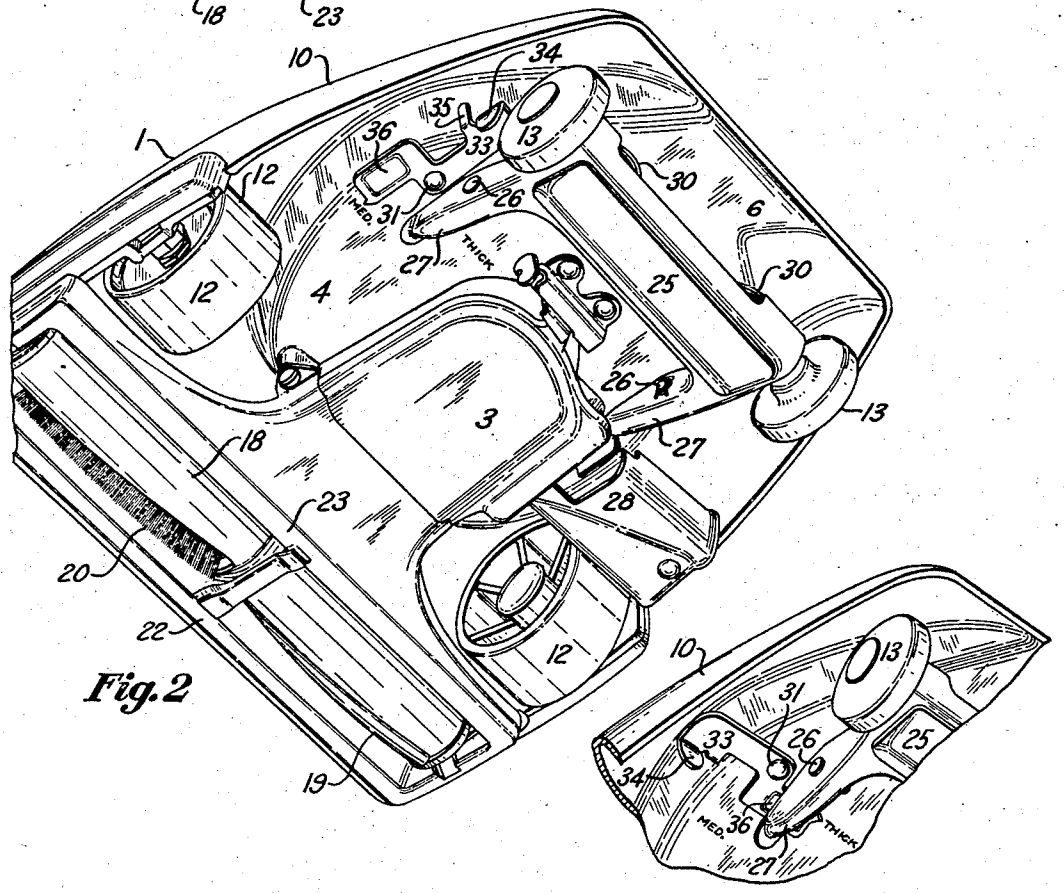


Fig.2

Fig.3

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SUCTION CLEANER

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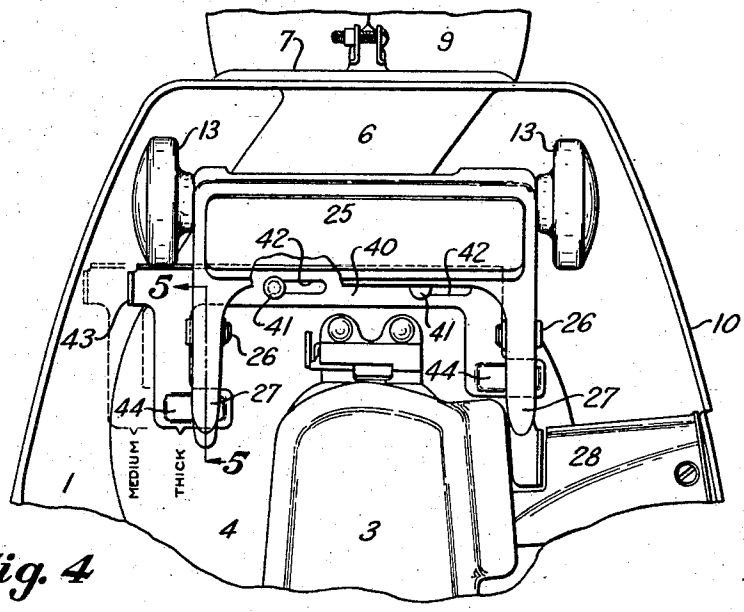


Fig. 4

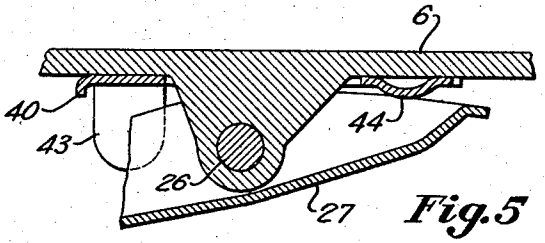


Fig. 5

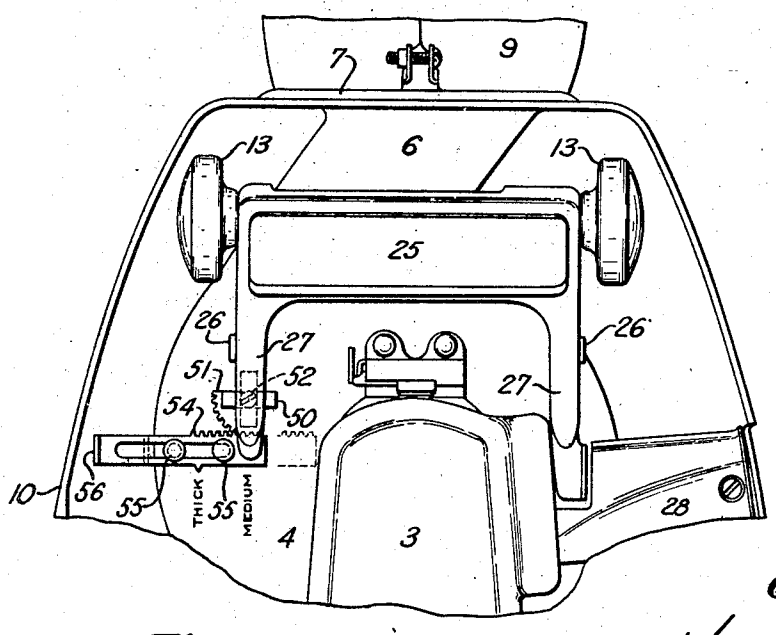


Fig. 6

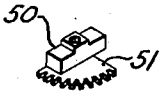


Fig. 7

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Patented Sept. 28, 1943 2,330,665

UNITED STATES PATENT OFFICE

2,330,665

SUCTION CLEANER

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Application May 4, 1942, Serial No. 441,658

5 Claims. (Cl. 15—9)

This invention relates to suction cleaners in general and more particularly to new and novel improvements in nozzle-height-positioning means in a suction cleaner. More specifically the invention comprises the provision of range-shifting means in a suction cleaner of the type in which the rear of the machine is depressed to permit of conversion from on-the-floor cleaning to off-the-floor cleaning.

It is an object of the present invention to provide a new and improved suction cleaner. It is a further object of the invention to provide new and improved nozzle-height-adjusting and range-shifting means in a suction cleaner. A further object of the invention is to provide a new and improved nozzle-height-adjusting construction in a suction cleaner of the type in which the rear of the machine is depressed in order to permit of conversion from on-the-floor cleaning to off-the-floor cleaning. A still further object of the invention is to provide a suction cleaner in which means are provided which automatically position the nozzle at a proper operating position on all but extremely thick surface coverings in combination with means which shift the range of effectiveness of the automatic nozzle-height-positioning means to permit of operation upon extremely thick surface coverings outside of the cleaner's normal range of operation. These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which preferred embodiments of the present invention are disclosed:

Figure 1 is a side view of a suction cleaner embodying the present invention with certain parts broken away;

Figure 2 is a partial bottom view in perspective of the cleaner illustrated in Figure 1 with the nozzle positioning means adjusted for the average rug or "Medium" position;

Figure 3 is a partial reproduction of the showing of Figure 2 with the nozzle adjustment positioned for "Thick" surface coverings;

Figure 4 is a partial bottom view of a cleaner similar to that shown in Figure 1 but provided with a second embodiment of the range-shifting mechanism;

Figure 5 is a partial section upon the line 5—5 of Figure 4;

Figure 6 is a partial bottom view of a third embodiment of the range-shifting mechanism in a cleaner of the kind illustrated in Figure 1;

Figure 7 is a view in perspective of the angularly positionable block or wedge shown in Figure 6.

The modern suction cleaner is adapted for on-the-floor cleaning and for off-the-floor cleaning. In the former the cleaner nozzle must at all times be positioned for optimum cleaning efficiency. To accomplish this result the scientific proportioning of the cleaner weight between the front wheels, which are relatively broad, and rear wheels, which are relatively narrow, provides a structure capable of providing automatic nozzle adjustment suitable for the wide range of surface coverings found in the usual home. This general relationship is disclosed and claimed in United States Letters Patent No. 2,267,764 granted to Charles H. Taylor on December 30, 1941. There are exceptional cases, however, in which the extreme thickness of the rug prevents the automatic nozzle height adjustment comprising the broad and narrow wheels from raising the nozzle to its optimum position. In order to provide maximum cleaner efficiency upon such coverings there is provided, according to the present invention, range-shifting means which adjust the position of the narrow rear wheels relative to the cleaner body thereby actually shifting the range of coverings on which the automatic nozzle adjustment functions satisfactorily.

Additionally in the modern suction cleaner the conversion from on-the-floor cleaning to off-the-floor cleaning usually involves the removal to an inoperative position of a converter barrier which normally prevents the attachment of the dusting tool converter element until the nozzle has been raised to an inoperative position. In the suction cleaner constructed in accordance with the present invention the barrier is moved to inoperative position to permit of the attachment of the converter element by depressing the rear of the machine to effect the pivotal movement of the wheel-carrying frame against the urging of a resilient spring. This spring, upon the removal of the converter element, functions to reestablish the initial relationship. Additionally, with the cleaner constructed in accordance with the present invention the depressing of the machine, in the manner just described for purposes of conversion, makes possible the adjustment of the manually operable range-shifter.

Referring again to the drawings and particularly to the first embodiment of the invention as illustrated in Figures 1 to 3, inclusive, a modern suction cleaner is seen to be illustrated and

to comprise a main casing 1 which includes a nozzle 2 interiorly connected by a passageway 3 to a suction-creating fan chamber 4 housing a rotatable fan 5. An exhaust outlet 6 extends rearwardly from the fan chamber and carries at its rear end a bag ring 7 detachably secured by means of a manually operable nut 8. A bag 9 is suitably secured at its mouth to ring 7. Casing 1 is formed along each side with skirts 10 which extend rearwardly from the nozzle 2 along the sides of the fan chamber to exhaust outlet 3. These skirts are largely for purposes of appearance and to serve to cover the supporting wheels, etc. The front supporting wheels are indicated by the reference character 12, being positioned just rearwardly of nozzle 2, and the rear wheels are indicated by the reference character 13.

A motor hood 15 is positioned upon the casing 1 immediately above the fan chamber 4 and encloses an unshown driving motor for the fan 5. The shaft 16 of the motor extends downwardly into the air passageway 3 where it connects to a power-transmitting belt 17 connected at its forward end to the rotatable agitator 18 within the nozzle 2. This latter element includes rigid beating elements 19 and flexible brush elements 20 and is adapted, in the operation of the machine, to contact, brush and beat a surface covering lifted by the suction within the nozzle 2 and into contact with the surface-contacting lips 22 and 23.

A handle is pivotally connected to the cleaner body within the motor hood 15 and is indicated by the reference character 26. Handle 26 is only partially shown in Figure 1 but, as is common and well known, has a sufficient length to enable the operator to grasp the end thereof conveniently in order to propel the machine without stooping or bending.

Rear wheels 13 are rotatably mounted on frame 25 pivoted upon pins 26 suitably supported on the underside of the exhaust outlet 6. As is clear in the drawings the frame 25 is U-shaped and at its ends forward of the pivot pins 26 form abutments adapted to contact the underside of the body 1 at the fan chamber 4. These abutment arms of the frame 25 are indicated by the reference character 27 and upon one side of the air passageway 3 it is seen that the arm 27 extends into a laterally extending passageway or seat 28. This seat is adapted to receive a converter element when attached to the machine in the off-the-floor cleaning operation. Clearly the dusting tool converter element cannot be inserted into the seat 28 to connect to passageway 3 until the abutment arm 27 has been moved downwardly from the seat 28 and accordingly this arm can properly be described as a barrier or barrier arm. Coil springs 30, 30 acting between the frame 25 and the underside of the exhaust outlet at all times urge the arms 27 into contact with the body and the removal of the barrier arm 27 downwardly from the converter seat must be accomplished by forcing the rear of the machine downwardly to pivot the frame against the force exerted by the springs.

Pivoted upon a pin 31 and rotatable against a frictional retaining force is a manually operable lever 33. Lever 33 is formed at one end with two overturned and oppositely directed shoulders. One shoulder 34 serves as a finger grip and extends in a substantially vertical plane. The second overturned shoulder 35 extends adjacent the side of fan chamber 4 and is adapted to make contact therewith in two angular positions of the lever to fix the limiting positions thereof. Forward of its pivot point the lever 33 is formed with a deformed or thickened portion 36 which functions as a wedge as will shortly be explained.

In the operation of the cleaner in on-the-floor cleaning upon all but extremely thick rugs range shifter 33 will be positioned as illustrated in Figure 2 and will be out of contact with the frame 25. The end of the lever will lie adjacent the letters "Med," indicating "medium" and referring to the usual type of covering and that the automatic nozzle adjustment comprising the broad and narrow wheels are within their normal or medium range suitable for operation on such coverings. When so related the cleaner is adapted to operate upon all except excessively thick coverings.

In the second adjustment of the range shifter, as illustrated in Figure 3, the thickened end portion or wedge 36 of the lever 33 extends under adjacent arm 27 of the wheel-carrying frame 25. The arm is held against the wedge 36 by the action of the coil spring 30 acting upon the rear of the frame. The result obviously is that the frame has been tilted upon its pivotal axis in this second relationship so that the rear wheels 13 are positioned closer to the cleaner body. When the cleaner is upon the floor, therefore, the rear of the machine will be lower and the nozzle will be higher. With the range shifter so positioned its one end is adjacent the word "Thick" found upon the underside of the body and indicating that when so positioned the cleaner is adapted to operate upon excessively thick coverings.

The shift from one range to a second is accomplished by the operator exerting a depressing force upon the rear of the machine, just as would be the case if he were attempting to remove the barrier 27 to permit of the insertion of dusting tools, and thereafter manually pivoting the lever 34 from one of its positions to the other. The withdrawal of the depressing force upon the rear of the machine enables the springs 30, acting at all times upon the frame 25, to force the frame arm 27 into engagement with the thickened or wedge end of the lever 33 or into contact with the underside of the cleaner body, depending upon the adjustment desired. The range is then fixed until intentionally altered by the same method.

Referring now to Figures 4 and 5 in particular a range-shifting adjustment is illustrated which is embodied in a cleaner of the exact type illustrated in Figure 1, the only differences lying in the range-shifting mechanism. The cleaner body and the front and rear supporting wheels and the pivotal mounting of the latter are in exact agreement with the first embodiment. In this second embodiment of the invention a U-shaped stamped frame 40 is slidably mounted upon the underside of the exhaust passageway 6 by pins 41 which extend through slots 42 in the frame. At one end the frame is formed with a down turned shoulder 43 which provides a finger grip portion to enable the operator to slide the frame transversely between positions determined by the length of the slots 42. These two positions are illustrated in full and dotted lines in Figure 4. The forward arm portions of the frame are formed with thickened abutment elements or wedges 44 which, in one position of the frame, are adapted to underlie the forward arms 27 of the wheel-carrying frame 25. As distinguished from the first embodiment it is to be noted, abut-

ments 44 underlie and are contactable by both frame arms.

As in the first embodiment the positions "Medium" and "Thick" appear upon the underside of the casing adjacent the two end positions assumed by one of the frame arms. In this second embodiment, as in the first, in order to adjust the nozzle range from the normal or "Medium" range to the exceptional or "Thick" range the operator first depresses the rear of the machine and then forces the finger grip element 43 of the frame from the dotted line position shown in Figure 4 to the full line position. In this position the thickened abutments or wedges 44 underlie the forward arms 27 of the wheel-carrying frame and when the pressure upon the rear of the body is released the rear wheels 13 are held closer to the underside of the body and the rear of the machine is lower. This, obviously, raises the nozzle end of the machine as in the first embodiment. Adjustment from the "Thick" to the "Medium" range is the exact reverse.

Referring now to Figures 6 and 7 the third preferred embodiment of the invention is disclosed. The cleaner structure and the mounting of the front and rear wheels is identical to the first and second embodiments. In this embodiment as in the two preceding embodiments the angular position of the wheel-carrying frame 25 is determined by the manual positioning of an abutment element or wedge. In the present embodiment, however, this element comprises a rotatable block 50 which is fixedly secured to a tooth pinion 51 and is mounted for rotation upon a vertical axis by means of a screw 52 extended into the underside of the fan chamber 3. Block 50 is so contoured and related to the adjacent arm 27 of the wheel-carrying frame 25 that, when extended in the direction of the length of the machine it fits within the arm which has an U-shaped cross-sectional contour. When the block is turned at right angles, however, as illustrated in full lines in Figure 6, the sides of the arm 27 make contact therewith resulting in the positioning of the wheel-carrying frame with the wheels 13 nearer to the cleaner body. This corresponds to the "Thick" position.

To adjust the block 50, an adjustment which must be accomplished as in the two preceding embodiments while the rear of the machine is depressed, there is provided a toothed ratchet 54 which is slidably carried by spaced pins 55 upon the underside of the fan chamber in such a position that its teeth mesh with the block sector 51. The ratchet plate 54 is formed with a turned over end 56 forming a finger grip portion which enables the operator to move it between the "Thick" and "Medium" positions indicated by those words positioned adjacent thereto. The angular adjustment of the sector 51 under the actuation of ratchet 54 positions the block 50 in its two positions indicated in full and dotted lines in Figure 6.

I claim:

1. In a suction cleaner, a body including a nozzle and a converter element seat, broad front wheels and narrow rear wheels to support said body movably over a supporting covering, a frame movably supporting said rear wheels for movement toward and from said body, a converter barrier carried by said frame adapted to extend into obstructing relationship to said seat, spring means urging a portion of said frame and said rear wheels from said body and said barrier into seat-obstructing position, said frame including an abutment element adapted to contact said body under the urging of said spring means to limit the movement of said rear wheels from said body to provide a first nozzle height adjustment, and a manually operable wedge shiftable into and from a position between said body and said abutment element in which it limits the movement of said rear wheels from said body to provide a second nozzle height adjustment, characterized in that said wedge is shiftable only with the rear of said body depressed against the force of said spring.

2. In a suction cleaner, a body including a nozzle and a converter element seat, broad front wheels and narrow rear wheels to support said body movably over a supporting covering, a frame movably supporting said rear wheels for movement toward and from said body, a forwardly extending converter barrier carried by said frame adapted to extend into obstructing relationship to said seat, spring means urging a portion of said frame and said rear wheels from said body and said barrier into seat-obstructing position, said frame including an abutment element extending forwardly under and adapted to contact said body under the urging of said spring means to limit the movement of said rear wheels from said body to provide a first nozzle height adjustment, a manually movable wedge carried by the underside of said body and shiftable into position between said body and said abutment element to further limit the movement of said rear wheels from said body to provide a second nozzle height adjustment, said wedge being fixed in place by said abutment and being shiftable only with said abutment spaced from said body and wedge by depressing said body against the force of said spring.

3. In a suction cleaner, a body including a nozzle and a converter element seat, broad front wheels and narrow rear wheels to support said body movably over a supporting covering, a frame movably supporting said rear wheels for movement toward and from said body, a forwardly extending converter barrier carried by said frame adapted to extend into obstructing relationship to said seat, spring means urging a portion of said frame and said rear wheels from said body and said barrier into seat-obstructing position, said frame including a forwardly extending abutment element adapted to contact said body under the urging of said spring means to limit the movement of said rear wheels from said body, to provide a first nozzle height adjustment, a manually operable pivoted wedge carried by the underside of said body and arranged to extend between said body and said abutment element in one position to further limit the movement of said rear wheels from said body to provide a second nozzle height adjustment, said wedge being movable into said one position only with said abutment element moved to inoperative position by the depression of said body against the force of said spring.

4. In a suction cleaner, a body including a nozzle and a converter element seat, broad front wheels and narrow rear wheels to support said body movably over a supporting covering, a frame movably supporting said rear wheels for movement toward and from said body, a forwardly extending converter barrier carried by said frame adapted to extend into obstructing relationship to said seat, spring means urging a portion of said frame and said rear wheels from said body and said barrier into seat-obstructing position,

said frame including a forwardly extending abutment element adapted to contact said body under the urging of said spring means to limit the movement of said rear wheels from said body, to provide a first nozzle height adjustment, a horizontally sliding wedge carried by the underside of said body and arranged to extend between said body and said abutment element in one position to further limit the movement of said rear wheels from said body to provide a second nozzle height adjustment, said wedge being slidable under said abutment element only with said body depressed against the force of said spring to move said element to inoperative position.

5. In a suction cleaner, a body including a nozzle and a converter element seat, broad front wheels and narrow rear wheels to support said body movably over a supporting covering, a frame movably supporting said rear wheels for movement toward and from said body, a forwardly extending converter barrier carried by said frame adapted to extend into obstructing relationship to said seat, spring means urging a portion of said frame and said rear wheels from said body and said barrier into seat-obstructing position, said frame including a forwardly extending abutment element adapted to contact said body under the urging of said spring means to limit the movement of said rear wheels from said body, to provide a first nozzle adjustment, a pivoted abutment-contactable element carried by the underside of said body including a toothed pinion and arranged to extend between said body and said abutment element in one position to further limit the movement of said rear wheels from said body to provide a second nozzle adjustment, and a manually operable means to adjust said abutment-contactable element comprising a toothed rack contacting said toothed pinion and movable to turn the latter.

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