Feb. 2, 1971 R. R. OGLE 3,559,230

ESCALATOR CLEANER

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Fig. 1 (Brush Down)

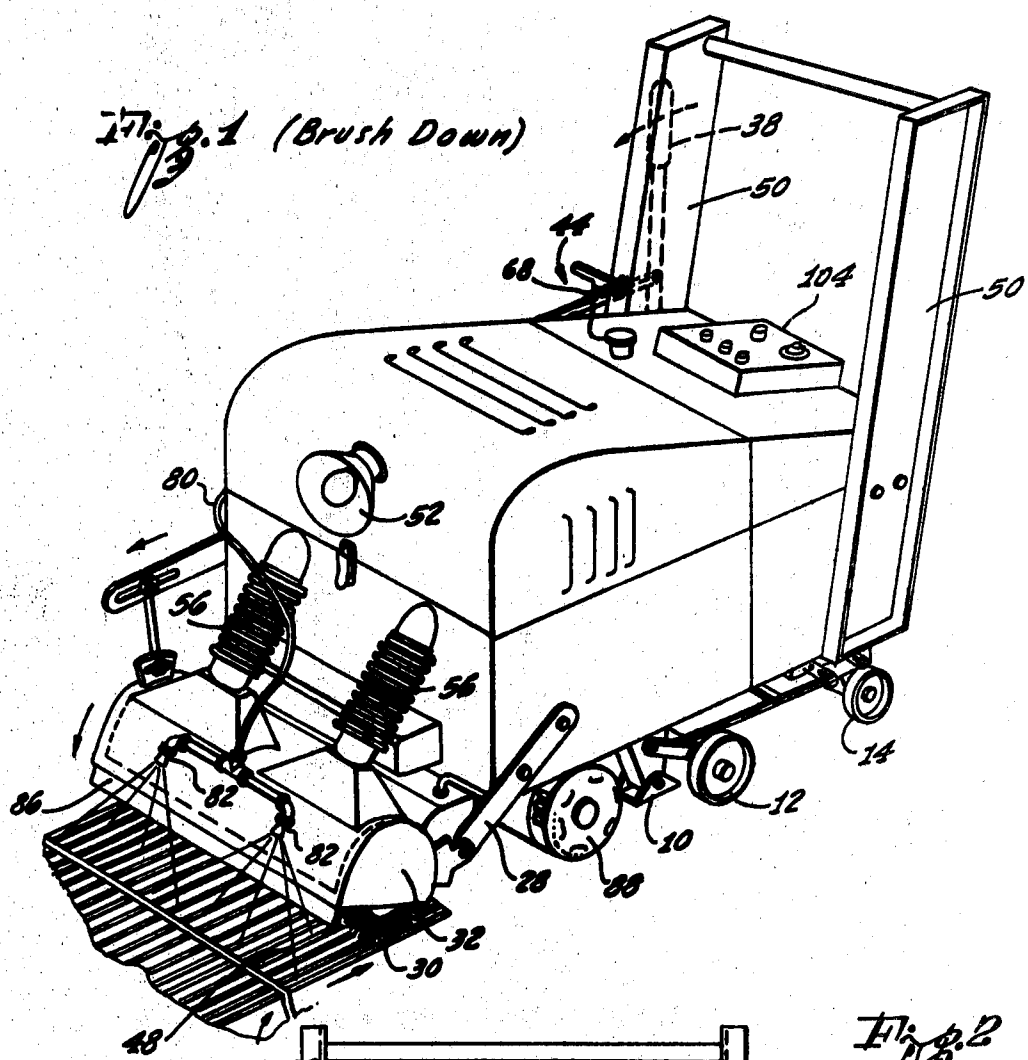
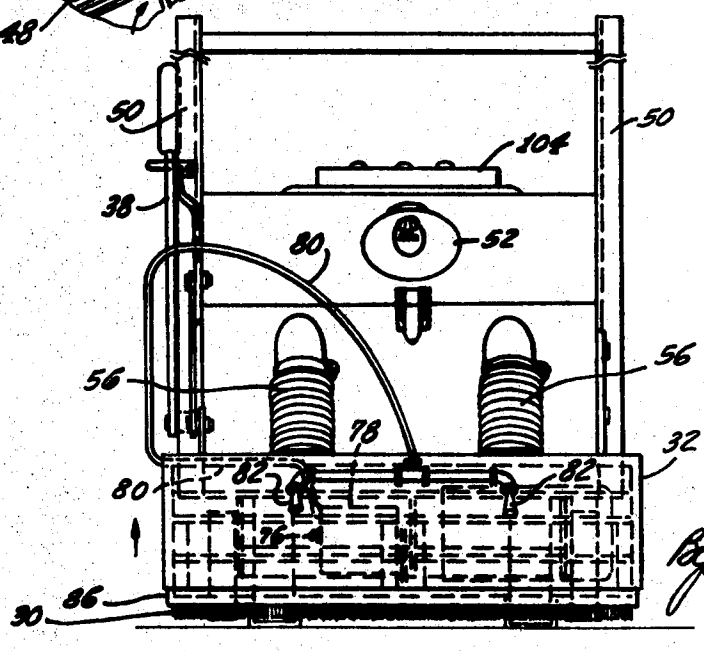



Fig. 2 (Brush Up)




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Fig. 3

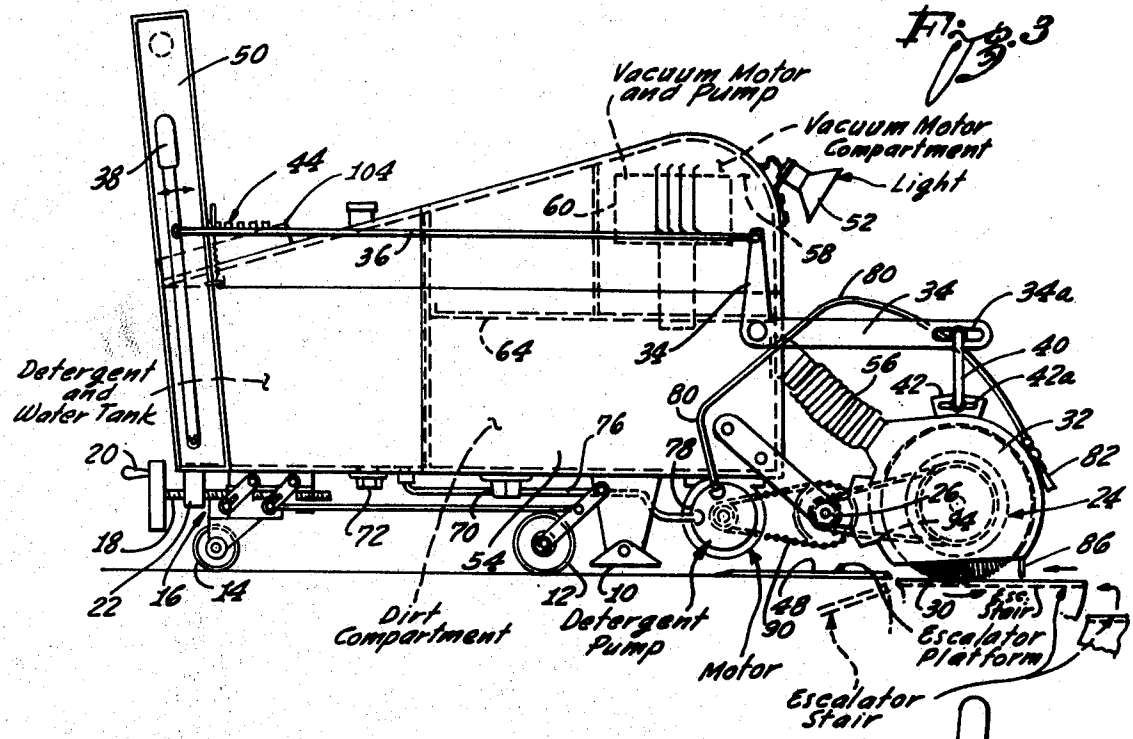
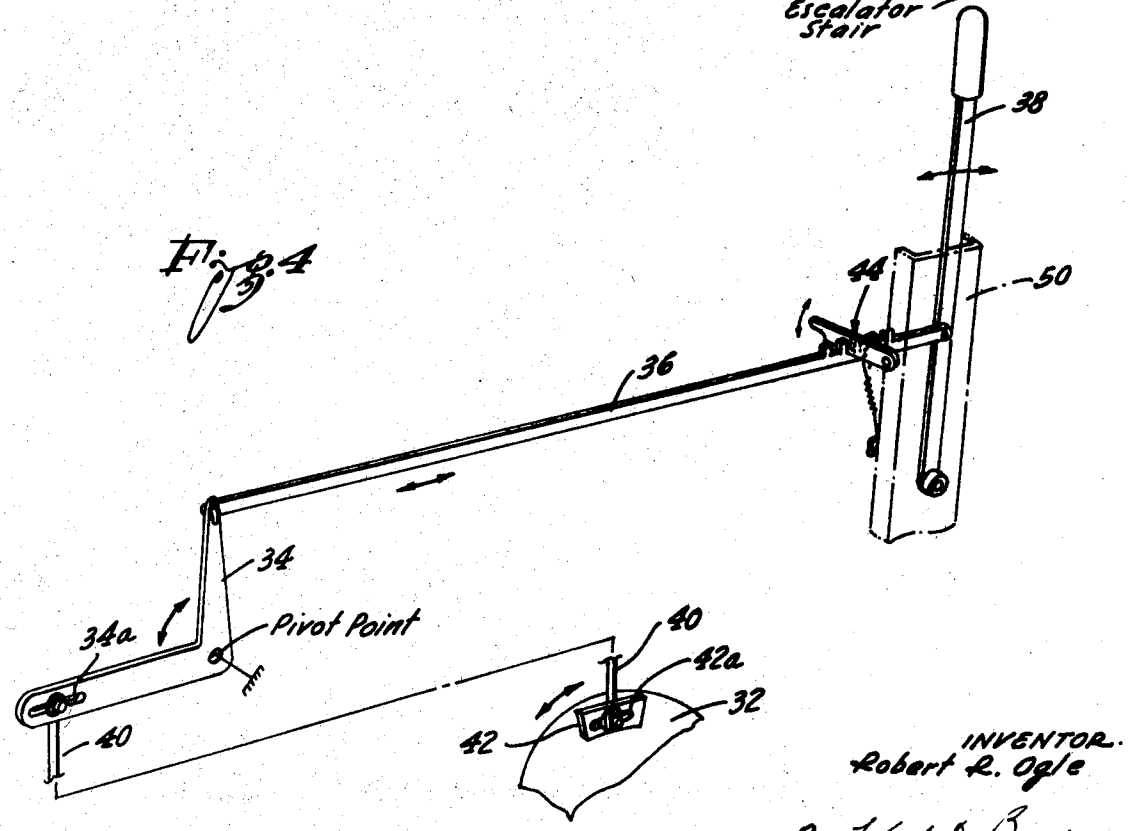



Fig. 4




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Fig. 5

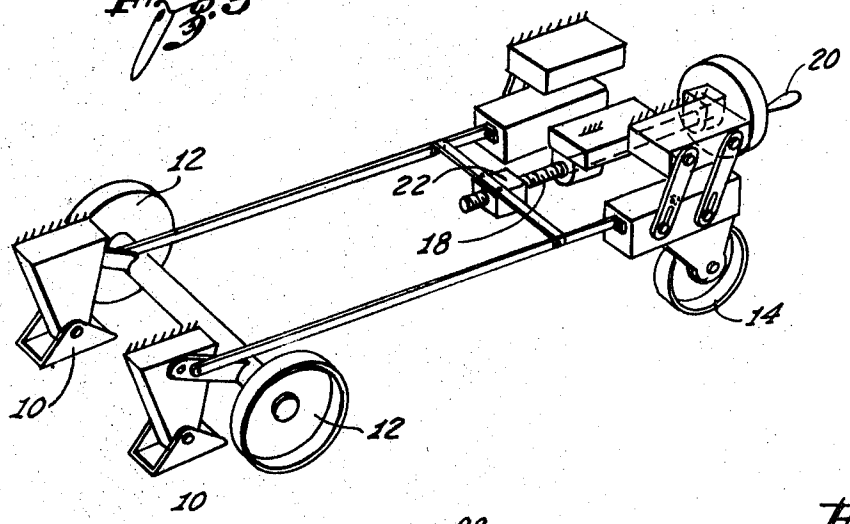



Fig. 6

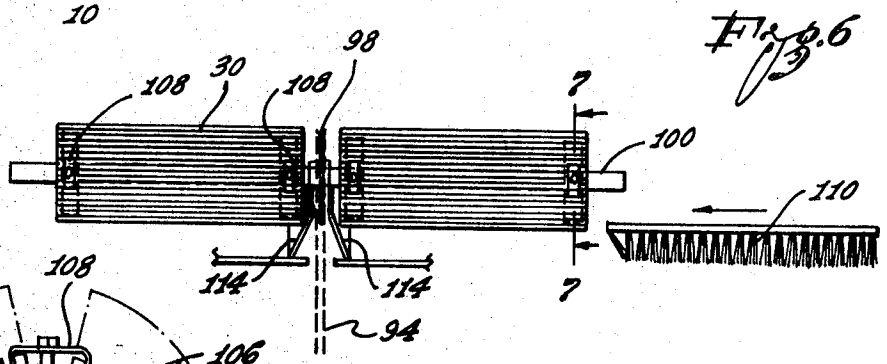



Fig. 7

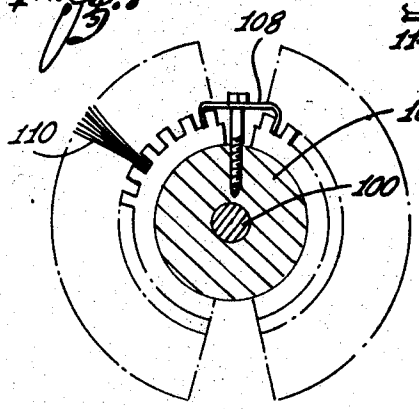
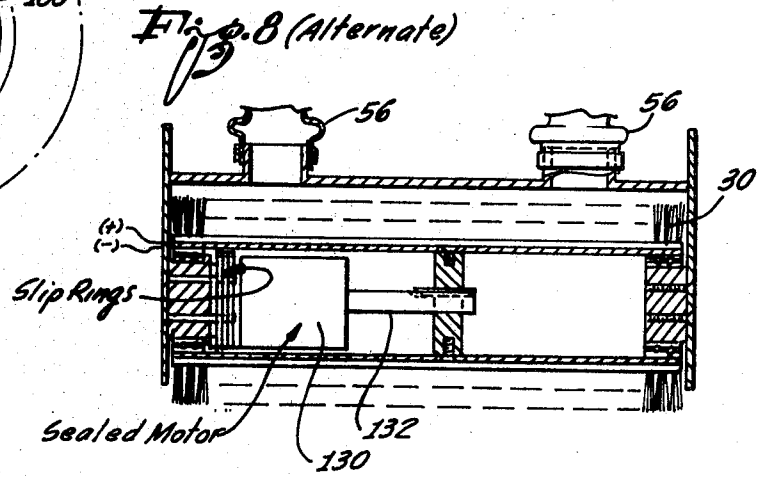



Fig. 8 (Alternate)




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ESCALATOR CLEANER

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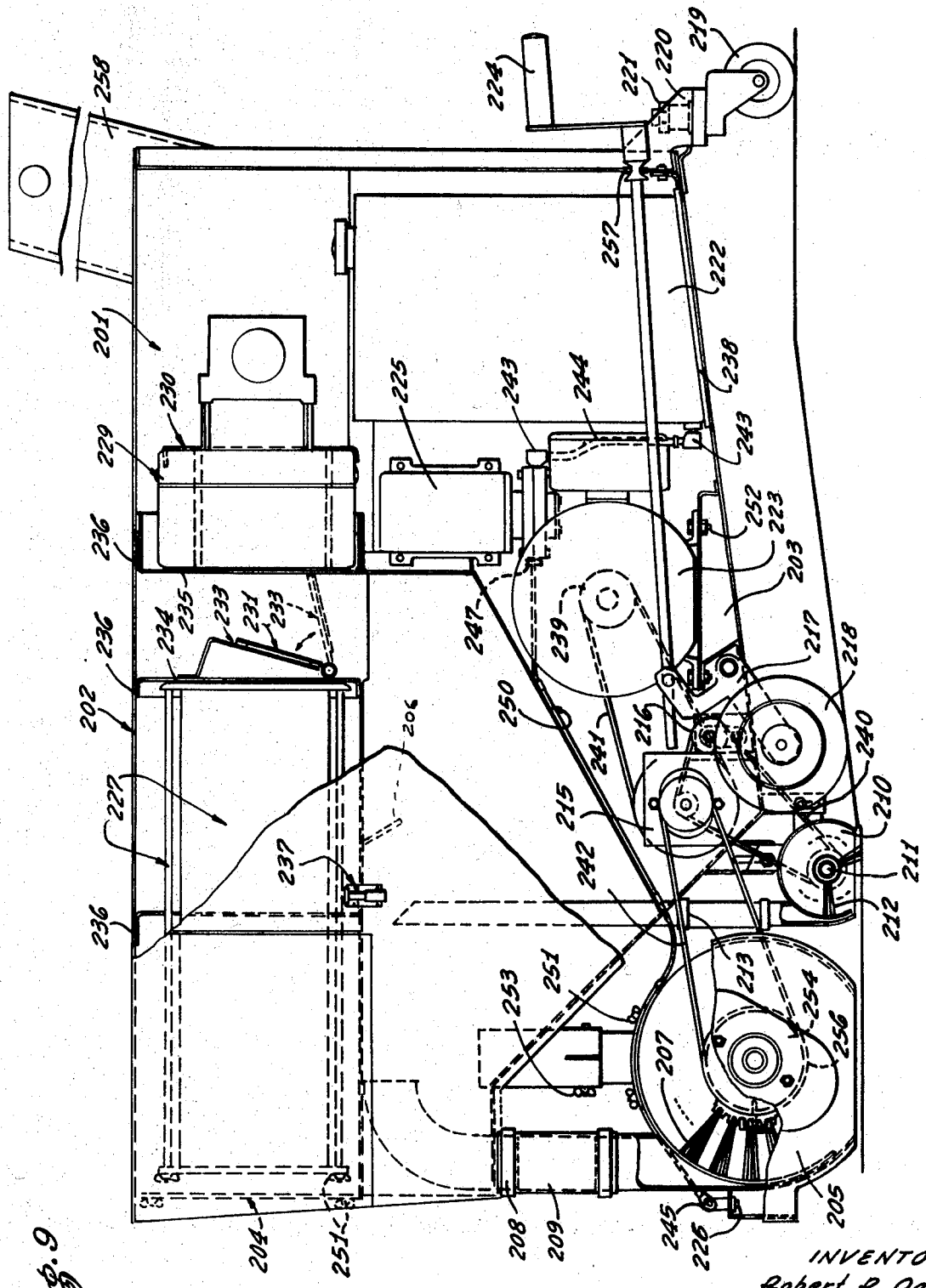



Fig. 9

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Fig. 10

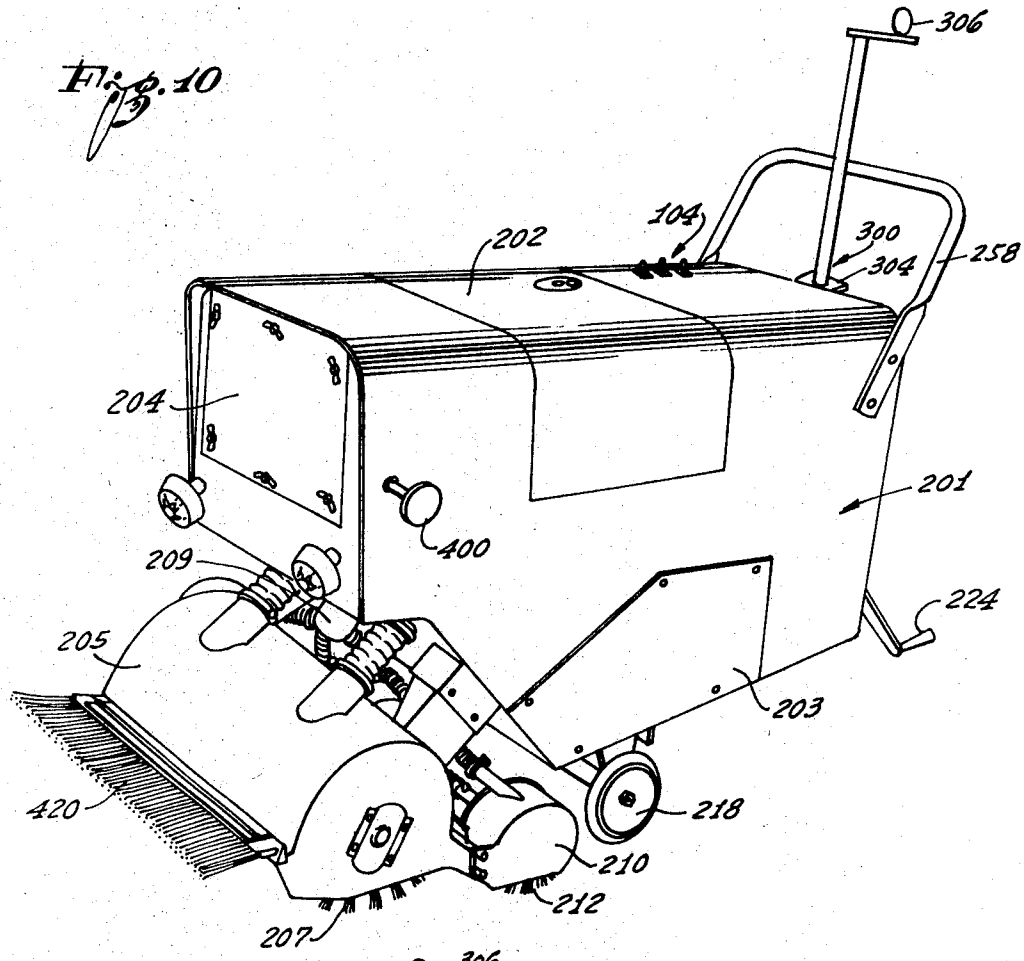
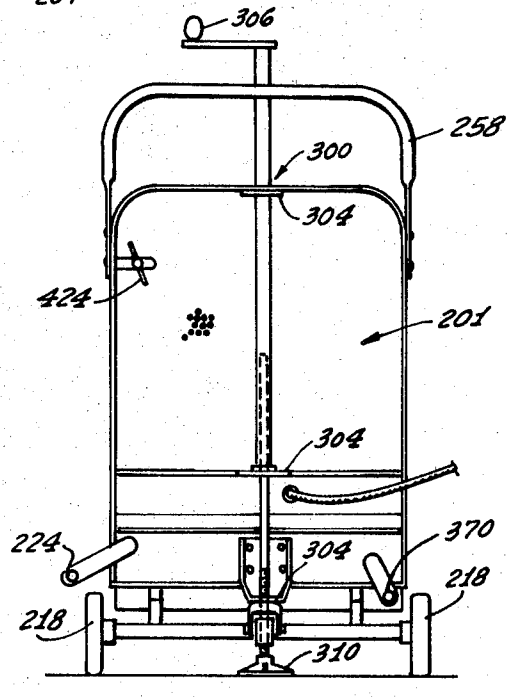



Fig. 11




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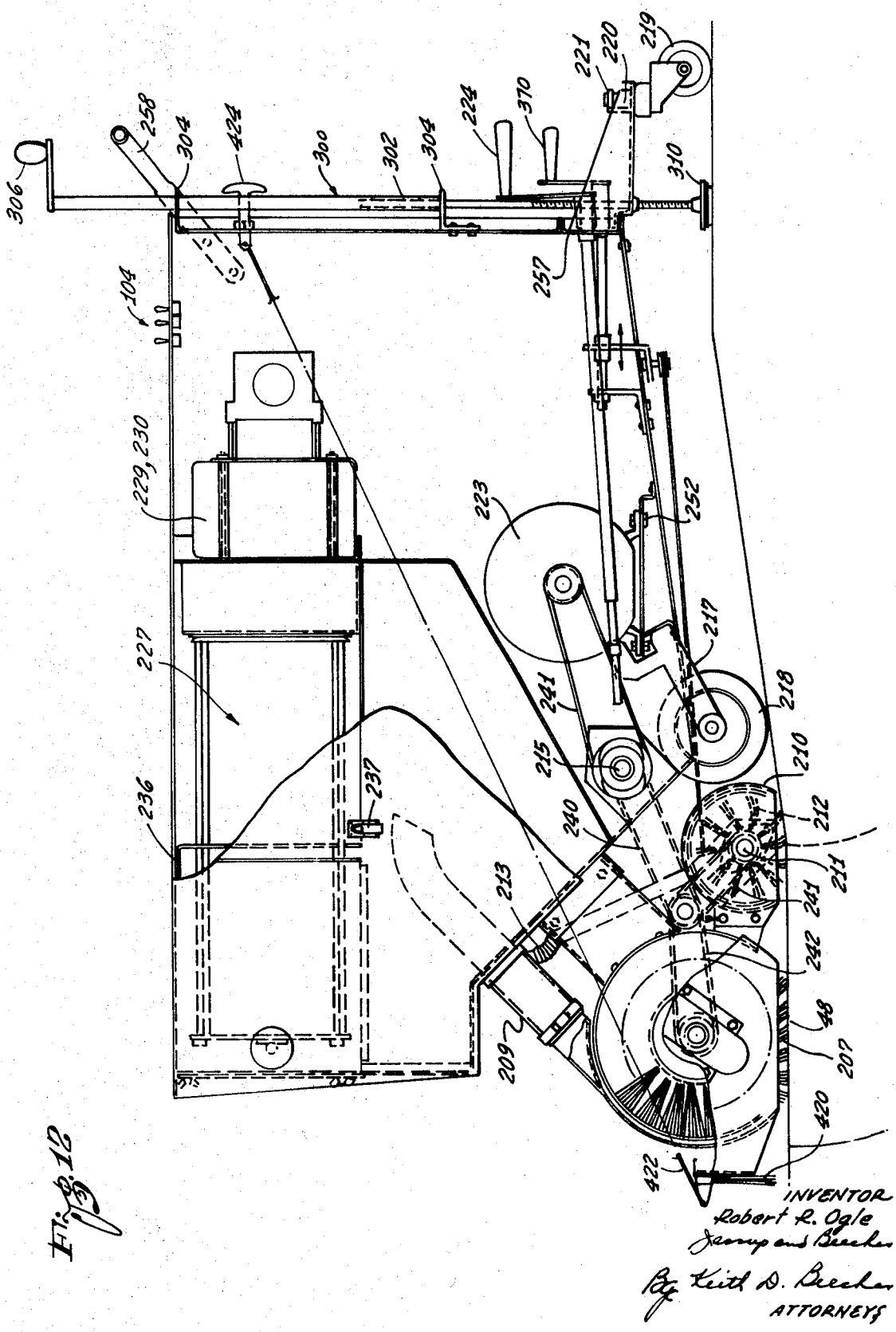



Fig. 12

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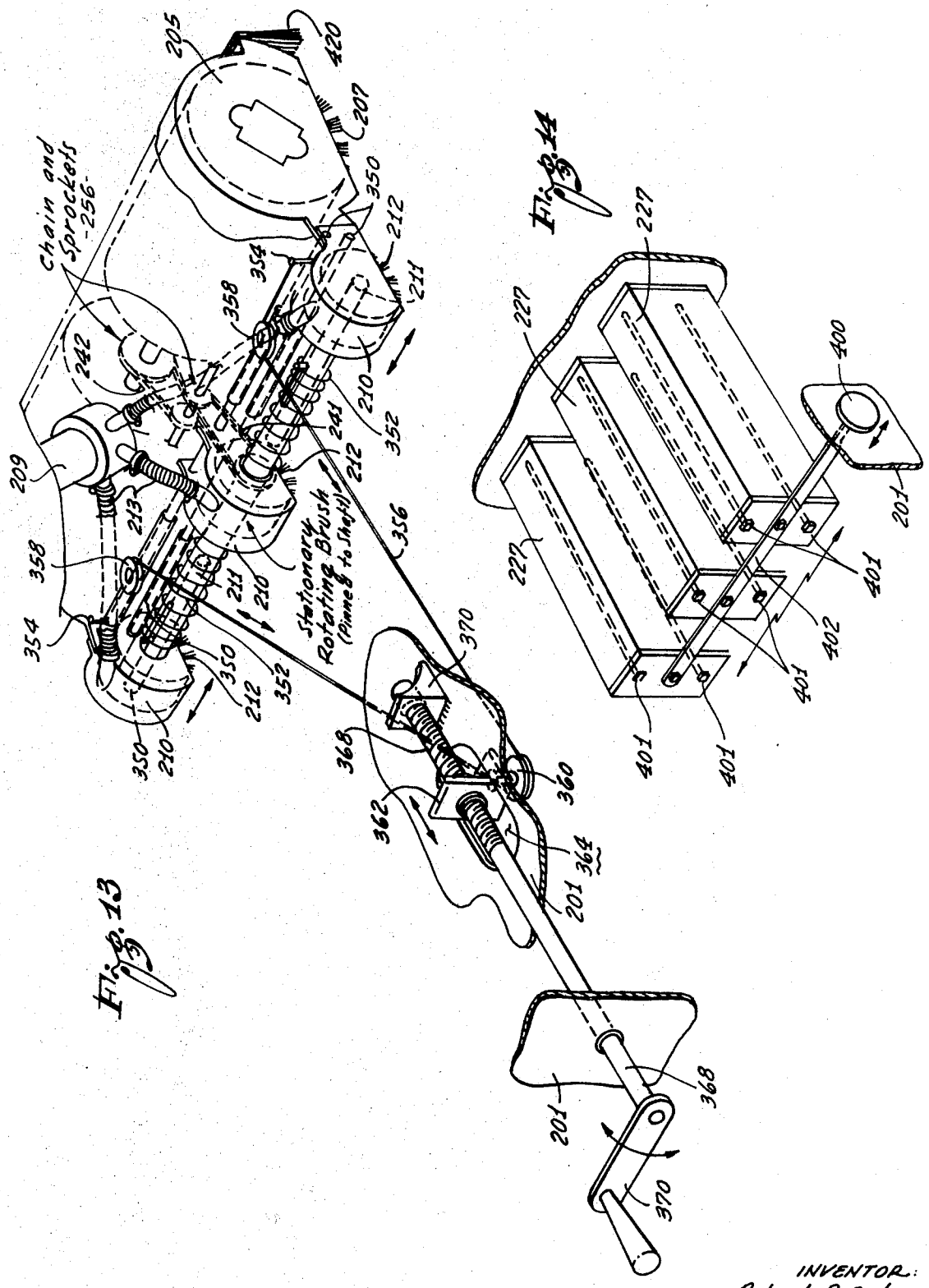



Fig. 13




Fig. 14




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United States Patent Office 3,559,230 Patented Feb. 2, 1971



3,559,230

# ESCALATOR CLEANER

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Continuation-in-part of application Ser. No. 667,574, Sept. 13, 1967. This application Mar. 24, 1969, Ser. No. 814,504

Int. Cl. A47l 7/02

U.S. Cl. 15—302 5 Claims

## ABSTRACT OF THE DISCLOSURE

An improved vacuum cleaning machine is described herein which may be wheeled to a position over the moving platform of an escalator; and which functions in an improved manner to clean the escalator as it moves under a rotating cleaning brush of the machine.

This application is a continuation-in-part of copending application Ser. No. 667,574, which was filed Sept. 13, 1967, in the name of the present inventor.

## BACKGROUND OF THE INVENTION

It has long been the practice to clean escalators by hand. However, this is a tiring and difficult operation, as it usually requires about six or seven hours to clean a typical escalator manually. As a comparison, the various embodiments of the machine of the present invention are capable of performing a thorough and complete cleaning job in from fifteen to twenty minutes with very little effort on the part of the operator.

Machines have been proposed in the past for cleaning escalators. However, because of the serrated configuration and peculiar shape of the usual escalator step, the prior art machines, for the most part, have been unable to accomplish a thorough or even satisfactory cleaning of the escalator. Moreover, the prior art machines are for the most part unduly complicated, difficult to handle, and slow in carrying out the required cleaning operation.

The cleaning machine of the present invention, on the other hand, is simple in its construction and easy to operate. Furthermore, the machine of the present invention is capable of thoroughly cleaning an escalator in a relatively short time.

The machine of the present invention is constructed so that it may be wheeled to a position in which its forward end and rotary cleaning brush project over the moving platform, for example, at the top of an escalator. When the machine is in such a position, its wheels may be retracted, and the frame thereof is lowered down into an operating position with its rotary brushes in cleaning relationship with the escalator platform.

In a manner to be described, the rotary brush of the cleaning machine is lowered in place across the escalator platform so that the bristles of the brush extend down between the serrations of the platform. The machine may then be activated to drive the rotary brush and, in some embodiments, subsequently to direct water and detergent spray down into the escalator platform in front of the brushes. For many operations, however, it has been found that there is no need for the water or detergent sprays, and the brush itself is capable of cleaning the escalator to a bright and shining finish.

The cleaning machine to be described includes in its various embodiments, a main rotary brush which is surrounded by a hood, and a vacuum is established across a transverse slot within the hood and in front of the brush. Certain embodiments include auxiliary brushes, which also will be described, and which are also equipped with appropriate hoods and transverse slots. The vacuum established in the machine serves to draw the dust, dirt and muddy water scrubbed from the escalator by the brushes up into the transverse slots and into a dirt compartment in the machine.



The cleaning machine of the present invention has been found to operate efficiently to clean escalators rapidly and thoroughly. Unlike the prior art machines, the rotary brushes of the machine of the present invention have been found capable of scrubbing the escalator clean; and the vacuum pressure in the transverse slots in the surrounding hoods has been found capable of drawing all dirt, as well as water, mud and detergent from the brush and escalator through the slots and into the aforesaid dirt compartment.

A flexible "squeegee" type of rubber guard may be mounted across the front of the main hood, and this guard extends down from the hood in front of the brush to the top surface of the escalator platform. The guard prevents splashing of the dirt, detergent and water during the operation of the machine, and helps to direct all the dirt and other extraneous matter into the interior of the hood so that such dirt and matter may be drawn into the aforesaid dirt compartment.

## SUMMARY OF THE INVENTION

The invention provides an escalator cleaning machine which is mounted on retractable wheels, and which has a forward portion capable of extending over the platform of an escalator. As will be described, the machine is capable of being lowered down into an operating position after it has been wheeled over the escalator platform. The machine includes a main rotary brush and a main hood surrounding the brush, the brush and hood being mounted on the frame of the machine. In some embodiments, the main brush and hood are mounted to be adjustably lowered, and in others the entire frame may be adjustably lowered, so that the main brush may be precisely positioned with its bristles extending down into the serrations of the escalator platform. Some embodiments of the machine include a detergent spray, as mentioned above. Certain embodiments of the machine also include auxiliary brushes adjacent the main brush which may be laterally adjustable, so that the entire width of the escalator may be cleaned in one pass.

The machine of the invention also includes appropriate combined or separate drive means which rotatably drives the aforesaid rotary brushes and which, in certain embodiments, also drives a detergent pump. The pump is used to provide the aforesaid detergent and water spray at the front of the unit. A second motor may also be included in the machine which drives a vacuum pump which, in turn, serves to draw dirt and other extraneous matter through the transverse slots in the main and auxiliary hoods, and into the dirt compartment of the machine.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing one embodiment of the invention in place with its forward end protruding over a movable escalator platform at the top of an escalator;

FIG. 2 is a front elevation of the machine of FIG. 1 with its rotary cleaning brush withdrawn to its up position;

FIG. 3 is a side elevation of the machine of FIG. 1; and with its rotary cleaning brush down in the operating position shown in FIG. 1;

FIG. 4 is a fragmentary perspective view of a control mechanism which may be included in the machine in FIG. 1, this view being helpful in explaining the function and operation of the control mechanism;

FIG. 5 is a fragmentary perspective view of the control mechanism which controls the retractable wheels in the machine of FIG. 1;

FIG. 6 is a fragmentary view showing the rotary brush which is used in the machine of FIG. 1;

FIG. 7 is a cross section taken substantially along the line 7—7 of FIG. 6;

FIG. 8 is a sectional view of the rotary brush of the machine, and showing a modified drive for the brush;

FIG. 9 is a side elevation of a modified embodiment of the machine with a portion of the side being broken away to reveal some of the internal components of the machine;

FIG. 10 is a front and side perspective of yet another embodiment of the invention;

FIG. 11 is a rear view of the machine of FIG. 10;

FIG. 12 is a side view of the machine of FIG. 10, partially broken away to reveal some of the internal operating components;

FIG. 13 is a perspective and somewhat schematic representation showing the manner in which certain auxiliary brushes are controlled in the machine of FIG. 10 so that they may be shifted laterally to accommodate different escalator widths; and

FIG. 14 is a perspective of certain filters which are included in the machine of FIG. 10.

## DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

The cleaning apparatus in the illustrated embodiments of FIGS. 1–7 includes a frame which supports a plurality of rigid feet **10**, and which extend down from the frame. The frame also supports a pair of retractable wheels **12**, as well as a retractable swivel wheel **14**, all these components being best illustrated in FIG. 5. A retracting control mechanism **16** is coupled to the wheels **12** and **14**, and this mechanism may be operated so as to retract the wheels and cause the machine to move downwardly and come to rest on the rigid feet **10**. The wheel retracting mechanism includes a lead screw **18** with a control handle **20** at one end. When the handle **20** is turned, the lead screw **18** turns in a threaded bracket **22**, and moves the retracting mechanism backward or forward so as to cause the wheels **12** and **14** to move downwardly, or to retract.

A brush assembly **24** (FIG. 3) is pivotally mounted at the forward end of the frame on a shaft **26**. The shaft **26** extends between a pair of brackets **28** which are mounted on the frame of the machine. The brush assembly includes a rotary brush **30**, and it also includes a cylindrical shaped hood, or cowl **32**. The brush **30** and the hood **32** are pivoted to the shaft **26**, so that both may be moved as a unit upwardly or downwardly with respect to the frame of the machine.

A second control mechanism is coupled to the brush assembly unit **24**, as shown in FIGS. 3 and 4. This second control mechanism includes a crank arm **34**, which is pivotally mounted to one side of the frame of the machine. A rod **36** couples one end of the crank arm **34** to a control handle **38**. The control handle **38** is pivoted to the rear end of the frame, and it may be manipulated by the operator to adjust the position of the brush **30** and its hood **32**. The other end of the crank arm **34** is coupled by a connecting rod **30** to a bracket **42** in the upper end of the hood **32**. When the control handle **38** is pulled back, the brush assembly unit **24**, including the brush **30** and its hood **32**, are moved to a stand-by position, as shown in FIG. 2. Then, when the control handle **38** is moved forwardly, the brush assembly **24** is moved down to its cleaning position, as shown in FIGS. **1** and **3**.

An appropriate spring loaded latch **44** is provided to hold the brush assembly in its up position of FIG. 2. When the latch **44** is released, and the handle **38** moved to the forward position, the brush assembly **24** is moved down so that the brush **30** may extend across the escalator platform **48**, for example, in proper position with its bristles extending down into the serrations of the platform, as shown in FIGS. 1 and 3, and in a scrubbing relationship with the platform.



It will be noted that the forward end of the crank arm **34** is provided with a slot **34***a* for one end of the connecting rod **40**, whereas the bracket **42** on the top of the hood **32** is provided with a slot **42***a* for the other end of the connecting rod. These slots permit appropriate adjustments to be made of the connecting rod **40**, so that the brush assembly **24** will assume a proper position for the particular escalator structure with which the machine is being used at any particular time.

A handle **50** is provided at the rear end of the machine to permit the operator to wheel the machine into position. An appropriate light **52** may be mounted at the forward end of the machine. The machine also includes, for example, a compartment **54** at its forward end which may be termed the "dirt compartment." A duct which extends around the inner surface of the front half of the hood **32** is coupled to the interior of the dirt compartment **54** by means, for example, of a pair of flexible hoses **56**. The aforesaid duct terminates in a transverse slot in the front of the brush **30** and adjacent the forward end of the hood.

A motor compartment **58** is provided on top of the dirt compartment **54**, and a vacuum motor **60** is housed within the compartment **58**. The vacuum motor **60** has an inlet **62** which extends down into the dirt compartment **54** so that the desired vacuum may be developed in the transverse slot in the hood **32**. An appropriate filter **64** is provided across the top of the compartment **54** so as to retain dirt in the compartment.

The machine also includes a detergent and water tank **66**, and detergent and water may be poured into the tank **66** through a filler cap **68**. Appropriate drain plugs **70** and **72** are provided for the compartment **54** and for the tank **66**. The detergent and water tank **66** is coupled through a flexible conduit **76** to a pump **78**. A further flexible conduit **80** couples the outlet of the detergent pump **78** to a group of spray nozzles **82** (FIGS. 1, 2 and 3) which are positioned on the front of the hood **32**. The detergent pump **78** serves to pump detergent and water under pressure from the tank **66** to the spray nozzles **82**, so that the detergent and water may be sprayed onto the top surface of the escalator platform **48** in front of the cleaning machine and before the platform moves under the brush **30**.

A rubber "squeegee" type of flexible guard **86** is mounted across the front of the hood **32**, and this guard bears against the top surface of the escalator platform **48**. The guard **86** serves to protect the surrounding area from being splashed by the action of the brush **30**, and to direct the dirty water from the brush into the slot in the hood **32**.

The brush **30** is rotatably driven, for example, by a motor **88** (FIGS. 1 and 3), and this motor may also be used to drive the detergent pump **78**. The motor **28** is coupled to the rotary brush **30** through a chain **90** which is coupled to a sprocket **92** on the shaft **26**. A second chain **94** extends from a second sprocket **96** to a sprocket **98** on the shaft **100** which supports the brush **30**.

As best shown in FIG. 1, an electric control panel **104** is provided at the rear of the machine. The controls for the various pumps and motors are mounted on this control panel.

As shown in FIGS. 6 and 7, the brush **30** may be divided in two parts, one on each side of the drive sprocket **98**. The two parts may be in the form of extrusions. They are mounted, for example, on a hub **106**, and are supported around the hub by means of appropriate brackets **108**. The brushes themselves, as shown as **110** in FIG. 6, are fitted into longitudinal slots in the extrusions. A pair of guides **114** (FIG. 6) prevents the bristles of the brushes from interfering with the action of the chain **94** and sprocket **98**.

When the machine is to be operated, it is rolled into a position so that its forward end extends over the top platform of the escalator, and so that its brush **30** extends across the platform, as shown in FIG. 1. Then, the retracting mechanism **16** is operated and the frame of the

machine is lowered down on its rigid feet **10**. The feet **10** are displaced to the rear of the escalator as shown, so that they may engage the floor adjacent the escalator platform. The latch **44** is released, and the handle **38** is moved forward, so as to lower the brush **30** and its hood **32** down on the platform of the escalator from the position shown in FIG. 2, to the position shown in FIGS. 1 and 3. An adjustment may be made for the connecting rod **40** within the slots **34***a* and **42***a* of FIG. 3, so that the brush **30** will properly engage the platform **38** of the particular escalator being cleaned at that particular time.

The vacuum motor **30** is turned on, and the motor **88** may then be energized to rotate the brush **30** and to start the detergent pump **78**. Assuming that the tank **66** is filled with water and detergent, or other appropriate cleaning fluid, the pump **78** causes a spray of detergent and water to be emitted from the nozzles **82**, and it also causes the brush **30** to rotate. The brush **30** rotates, for example, at around ninety revolutions per minute, and in a clockwise direction in FIG. 3, against the movement of the escalator platform.

As the brush **30** rotates, it sweeps dirt into the aforesaid transverse slot in its hood **32**, and the dirt is drawn by the vacuum motor **60** into the dirt compartment **54** of the machine. It is usual to sweep the escalator first with the brush **30** rotating without the detergent and water, and then to turn on the water and detergent for a subsequent pass so that the machine may thoroughly clean the escalator. During the latter operation, the resulting dirty water is drawn by the vacuum motor **60** up through the slot in the hood **32**. During the initial dry cleaning operation, any dust developed is also drawn through the slot in the hood **30** and into the dirt compartment. The dirt is retained in the dirt compartment by the filter **64**, and the machine may be periodically cleaned. Any water in the compartment may be drained by opening the plug **70**.

In the embodiment of FIG. 8, the brush drive motor **130** is mounted inside the brush **30**, and it has a shaft **132** which drives the brush in the illustrated manner. This mounting of the drive motor simplifies to a large extent the drive of the brush, as compared with the arrangement shown in FIGS. 3 and 6, since it obviates any need for chains, sprockets, or the like.

A second embodiment of the invention is shown in FIG. 9, and the second embodiment includes a body assembly designated generally as **201**. The body assembly is equipped with a hood cover **202** at the top, and a side access cover **203** on one side. The body assembly also includes a front access door **204** which permits access to a removable dirt filter cartridge, as will be described.

The embodiment of FIG. 9 also includes a cylindrical shaped hood, or cowl **205** for the main rotary brush **207**, which brush may be similar to the rotary brush **30** of the previous embodiment. As before, the hood **205** surrounds the brush **207**, and it includes an internal duct which defines a transverse slot at the forward end of the hood in front of the brush **207**. A vacuum pressure is provided at the transverse slot through a pair of hoses **209** which are clamped to the body assembly **201** by suitable clamps **208**, the slot being coupled to a vacuum motor through the hoses **209**. The slot provides suction at the leading edge of the hood assembly as the brush **207** rotates. The slot has a width, for example, of ¼ of an inch, and sufficient vacuum pressure is provided in the slot to draw all the dust, water and dirt scrubbed from the escalator by the brush **207** into the machine. The dust and dirt are drawn through the duct into an internal compartment in the body portion **201** by vacuum suction to be described.

A baffle **206** is provided in the dirt compartment of the machine of FIG. 9. When the machine is operating in a mode in which water and detergent are sprayed onto the escalator platform, the resulting dirty water drawn into the dirt compartment through the hoses **209** strikes the baffle **206** and falls to the bottom of the compartment. However, when the machine is in a mode in which dust is being swept from the escalator by the brush **207**, the dust is drawn into the dirt compartment and passes around the baffle **206** into a removable filter cartridge **227** which, likewise, will be described.

Three auxiliary rotary brush assemblies and associated hoods, or cowls, such as the hood **210** are provided. These three auxiliary brush assemblies may, for example, each be of the order of three inches wide, and they are positioned at both ends of the main brush **207** and at the center. The auxiliary brushes serve to clean the portions of the escalator on each side of the main brush where it is difficult for the main brush to reach, and also at the center, where the efficiency of the main brush is impeded by the drive to the brush, as best represented by FIG. 6, for example.

The auxiliary brush assemblies each include a rotary brush, such as the brush **212**, and all are mounted on a common shaft **211** which, in turn, is rotatably mounted in the body assembly. An auxiliary vacuum hose, such as the hose **213**, is provided for each of the auxiliary brush hoods **210**. These latter hoses are coupled to ducts in the respective auxiliary hoods, and the ducts provide transverse slots at the leading edge of each of the auxiliary brushes. This enables dirt and dust scrubbed from the escalator by the auxiliary brush assemblies to be drawn into the dirt compartment in the body assembly **201**. The auxiliary brush shaft **211** is driven by a belt or chain **240** from a jack shaft assembly **215**, the chain drive including an adjustable idler assembly **216**.

The embodiment illustrated in FIG. 9 does not include the support feet **10** of the previous embodiment. The latter mechanism is supported by a pair of wheels, such as the wheel **218**, these being pivotally mounted on the body assembly **201** by an appropriate bracket **217**. The mechanism also includes a swivel castor **219**, which is pivotally mounted to the rear of the body assembly **201** on a castor bracket **220**, the castor bracket being held in the assembly by an appropriate nut **221**.

A detergent tank **222** is mounted in the body assembly **201** to the rear thereof, as shown in FIG. 9. During the operation of the machine, the detergent tank **222** contains appropriate detergent and water, or other appropriate cleaning fluid. An electric motor **223** is supported in the body assembly **201** in front of the detergent tank **222**, the motor being used to drive the main and auxiliary rotary brushes of the machine. The motor **223** may, for example, be a ¾ horsepower, 1200 r.p.m. electric motor.

A wheel retracting mechanism including a manually adjustable handle **224** is coupled to the bracket **217**, so that the wheel **218** may be retracted adjustably, and may be locked at any position. The handle **224**, for example, is turned until the wheel **218** assumes a selected position to adjust the brush **207** to the proper elevation with respect to the escalator properly to perform its cleaning function. The adjustment of the wheel retracting mechanism is carried out by means of an appropriate lead screw arrangement whereby locking of the wheels **218** at any selected angular position is automatically achieved. The wheel retracting mechanism includes a bearing **257**.

An electrically operated detergent pump **225** is also mounted in the body assembly **201**. The detergent pump serves to pump the detergent and water from the tank **222** to a spray nozzle **226** at the front of the machine, whenever it is desired for the machine to operate in a washing mode. As illustrated, the spray nozzle **226** is enclosed in an appropriate housing **227**, so that the detergent spray is directed towards the escalator and is prevented from spraying the surrounding area.

The vacuum motors **229** and **230** serve to draw the dust from the aforesaid dust compartment into the filter cartridge **227** when the diverter valve **231** is in the position shown by the dotted lines **233**. However, when the mechanism is in the detergent mode of operation, the diverter valve **231** is placed in the position shown by the

solid lines **233** so that the vacuum motors do not tend to draw the dirty water resulting from the washing operation during the detergent mode through the filter cartridge. Instead, the water strikes the baffle **206** and collects at the bottom of the dirt compartment.

Appropriate filter seals **234** are provided for the filter cartridge and further seals **235** and **236** are also provided adjacent the vacuum motors **229** and **230**. The hood **202** over the filter cartridge **227** may be latched to the body assembly by means of an appropriate latch **237**. The detergent tank **222** may be supported on the bottom of the body assembly **201** by a felt pad **238**.

The chain **240** of the chain drive assembly for the auxiliary brush shaft **211** extends over a sheave on the shaft **211**, and over a sheave on the jack shaft assembly **215**, and over the idler **216**. The jack shaft assembly **215** is driven by a belt or chain **241** which extends around the sheave **239** on the drive shaft of the motor **223**. A further chain **242** extends from the jack shaft **215** and around a sheave **256** on the drive shaft for the main brush **207** so as to provide a drive for the main brush **207**. The main brush assembly is mounted in appropriate bearings covered by bearing support plates, such as the plate **254**.

The detergent from the detergent tank **222** is drawn into the pump **225** through a line **244** and through appropriate couplings **243**. The pressurized detergent and water from the pump is pumped through a line **250** and appropriate couplings **247** to the spray nozzle **226**.

The cylindrical hood cover for the rotary shaft **207** is suspended on a bracket **253**, the hood being indicated as **251**. The position of the hood cover is adjustable, so that it may at all times be closely positioned adjacent the peripheral surface of the brush **207**, and maintained in that position as the brush **207** wears. The mechanism is equipped with an appropriate handle **258**, by means of which the mechanism may be wheeled on the wheels **218** and castor **219** over the escalator platform.

In the operation of the machine of FIG. 9, the handle **224** is turned to retract the wheels **218**, and to lower the main brush **207** and the auxiliary brushes **212** down on the escalator platform. The motor **223** is then energized, so as to activate the main and auxiliary rotary brushes. As mentioned above, the machine may be used without the detergent and water, during which the diverter valve **233** is placed in the dotted position, so that the dust may be drawn by the vacuum motors **229** and **230** through the filter cartridge **227**. The dust is drawn through the ducts in the main and auxiliary brush hoods by hoses, such as the hoses **209** and **213** into the inner dirt compartment of the body assembly and through the filter cartridge **227**, with the dust and dirt collecting in the filter cartridge. The filter cartridge itself may be removed from time to time through the access door **204** to dispose of the collected dust therein.

When the detergent pump **225** is activated, water and detergent are sprayed through the nozzle **226** and down through the shielding bracket **227** onto the escalator platform. The rotary brush scrubbing action of the mechanism then causes dirty water to be drawn through the aforesaid duct and into the dirt compartment. During this latter operation, and in order to provide maximum suction through the ducts, the diverter valve **231** is moved to the solid line position **233** in FIG. 9. The dirty water, as mentioned above, is drawn into the dirt compartment during the latter operation and strikes against the baffle **206** and falls to the bottom of the dirt compartment, so that it may be subsequently drained.

The embodiment of FIGS. 10–14 is similar in some respects to the embodiment of FIG. 9, and like components have been designated by the same numbers.

In the latter embodiment, a rear jack assembly **300** is provided which includes a vertical shaft **302** rotatably supported in brackets **304** on the rear end of the assembly, and operated by a handle **306**. Appropriate threads are provided, so that rotation of the handle **306** causes a pad **310** to be displaced downwardly, as the handle is turned in one direction. The jack forms a stable support for the apparatus when it is in place over the elevator platform, and when it is lowered, it effectively raises the castor **219** up from the supporting surface.

The embodiment of FIGS. 10–14 also has a feature in that the outer auxiliary brushes and cowls **212**, **210** can be adjusted outwardly or inwardly in a transverse direction, so as to accommodate the machine to different widths of escalators. The control of the outer auxiliary cowls and brushes **210**, **212** is best shown, for example, in FIG. 13. The outer cowls and brushes are supported on a pair of guides **350**, and are movable along the guides. The outer auxiliary guide and brush assemblies are biased outwardly with respect to the central guide and brush assembly by means of a pair of springs **352** which are coiled about the operating shaft **211** of the auxiliary brush assemblies.

Each of the cowls **210** of the outer auxiliary assemblies is equipped with a pin **354**, and a cord **356** has its extremities attached to the pins, and extends around a pair of pulleys **358**, which are mounted on the frame of the apparatus. The bight portion of the cord **356** extends around a further pulley **360**, the latter pulley being supported on a bracket **362**. The bracket **362** moves back and forth in a slot **364** in the bottom of the body assembly **201**, the bracket being threaded onto a lead screw **368**. The lead screw **368** is rotatable in a further bracket **370** on the body assembly **201** and extends through a hole in the rear wall of the body assembly. The lead screw **368** is turned by a handle **370**.

It will be appreciated that rotation of the handle **370** causes the bracket **362** to move back and forth, so that the cord **356** is pulled around the pulley **358** to move the outer auxiliary hood and brush assemblies **210**, **212** inwardly against the spring bias of the springs **352**. With this adjustment, the effective cleaning width of the apparatus may be controlled to accommodate a variety of escalator widths.

A plunger **400** (FIGS. 10 and 14) is provided on the side of the body assembly **201**, and the plunger is coupled to the ends of the cartridge filter elements **227**. The cartridge filter elements are mounted at one end on the internal bracket within the apparatus, and their left hand ends in FIG. 14, for example, are free. The filter elements **227** are supported by means, for example, of bolts **401** extending along the length of the individual filter elements and secured to the aforesaid bracket. The plunger **400** is coupled to the free ends of the filter elements by means of a strip **402**. Whenever dust accumulates on the exterior of the filter elements, the bracket **400** may be slapped inwardly, so as to vibrate the filter elements and cause the dust to fall down to the bottom of the dust compartment, and thereby prevent clogging of the elements.

The embodiment of FIGS. 10–14 is also equipped with a brush **420** which is hinged to the forward edge of the main brush cowl **205**. The brush **420** may be moved between its inoperative position, as shown in FIG. 10, and its operative position of FIG. 12 by means, for example, of a wire **422** which is actuated by an appropriate control **424** at the rear of the unit. This brush may perform, for example, a preliminary sweeping action as the escalator platform moves towards the machine, so as to perform a preliminary sweeping operation, as mentioned above.

The hoods, or cowls, and associated brushes in the latter embodiment are easily detachable, for repair or replacement purposes. The brushes themselves may appropriately have the bristles attached thereto in a spiral manner, and may be formed with alternate rows of bristles of nylon and abrasive nylon for best results.

The invention provides, therefore, an improved machine which is simple and straightforward in its construc-

tion, which is easy to operate, and which is efficient in its operation.

What is claimed is:

1. In an escalator cleaning machine adapted to be positioned over the moving platform of an escalator, said machine including: a frame; a plurality of wheels retractably mounted on said frame; a retracting mechanism coupled to said wheels for retracting said wheels and thereby lowering said frame to a desired elevation; the combination of: a brush assembly unit mounted on said frame and including at least one rotary main brush to engage the moving platform of the escalator in brushing engagement with the surface thereof; drive means coupled to said rotary main brush for imparting rotary movement thereto; a cowl mounted on said frame and forming a hood for said brush, said cowl forming a transverse slot adjacent said brush; vacuum pump means supported on said frame for establishing a vacuum pressure in said transverse slot; a housing mounted on said frame and forming a dirt receiving compartment; conduit means coupling said transverse slot formed by said cowl to the interior of said compartment, said cowl and brush assembly being pivotally mounted on said frame; and a control mechanism for selectively moving said rotary main brush down into a brushing position with respect to the moving platform of the escalator, said control mechanism including a crank arm pivotally mounted on said frame, a control arm coupled to one end of said crank arm, a connecting rod coupling the other end of said crank arm to said brush assembly, the other end of said crank arm having an adjustment slot therein for receiving one end of said connecting rod; and a slotted bracket on said cowl for receiving the other end of said connecting rod.

2. The combination defined in claim 1, in which said drive means for said brush includes an electric motor mounted internally of said brush.

3. In an escalator cleaning machine adapted to be positioned over the moving platform of an escalator, said machine including: a frame; a plurality of wheels retractably mounted on said frame; a retracting mechanism coupled to said wheels for retracting said wheels and thereby lowering said frame to a desired elevation; the combination of: a brush assembly unit mounted on said frame and including at least one rotary main brush to engage the moving platform of the escalator in brushing engagement with the surface thereof; drive means coupled to said rotary main brush for imparting rotary movement thereto; a cowl mounted on said frame and forming a hood for said brush, said cowl forming a transverse slot adjacent said brush; vacuum pump means supported on said frame for establishing a vacuum pressure in said transverse slot; a housing mounted on said frame and forming a dirt receiving compartment; conduit means coupling said transverse slot formed by said cowl to the interior of said compartment, and a pair of laterally movable auxiliary rotary brushes mounted on a common axis in tandem with the aforesaid main rotary brush, said auxiliary brushes extending laterally beyond each end of the aforesaid main rotary brush; means supporting said auxilary brushes on said frame for lateral movement of said auxiliary brushes with respect to said frame, and a control mechanism coupled to said auxiliary brushes for adjusting the lateral position thereof.

4. The combination defined in claim 3, which includes a third auxiliary brush positioned on said common axis adjacent the center of the aforesaid main rotary brush.

5. The apparatus defined in claim 1, and which includes a transverse brush element mounted on the forward edge of said cowl in hinged relation therewith, and means for adjusting the angular position of said transverse brush element.




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