Oct. 19, 1954 W. A. HUMPHREY 2,691,791

LOW HEIGHT SUCTION CLEANER

Filed May 26, 1951 6 Sheets-Sheet 1

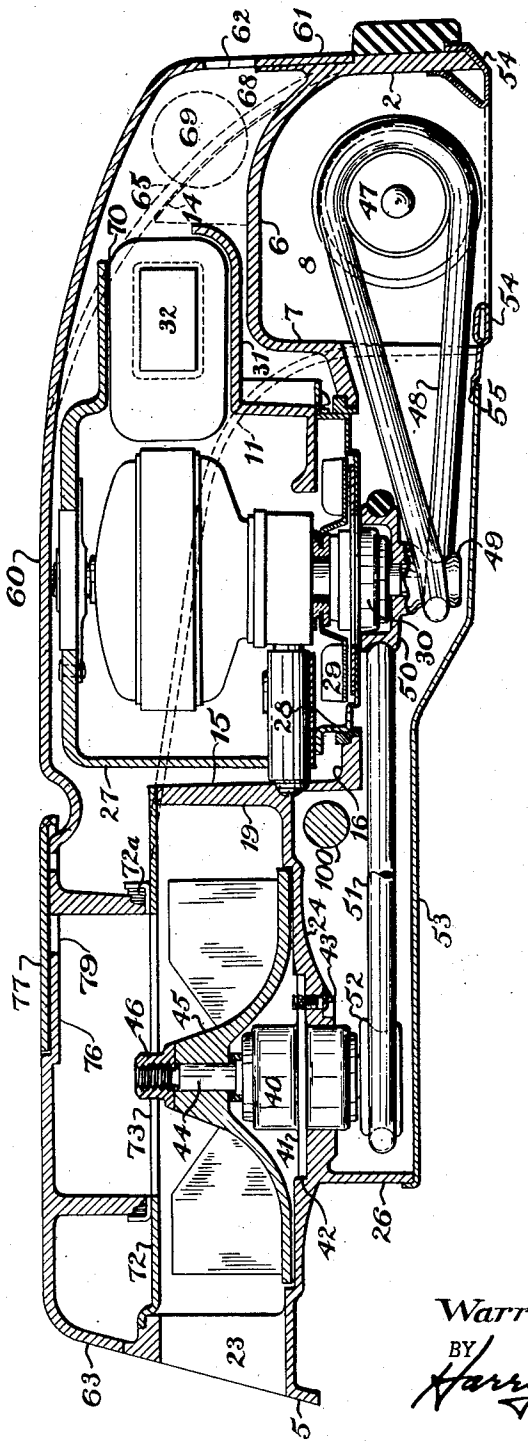

Fig. 1

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Filed May 26, 1951 6 Sheets-Sheet 2

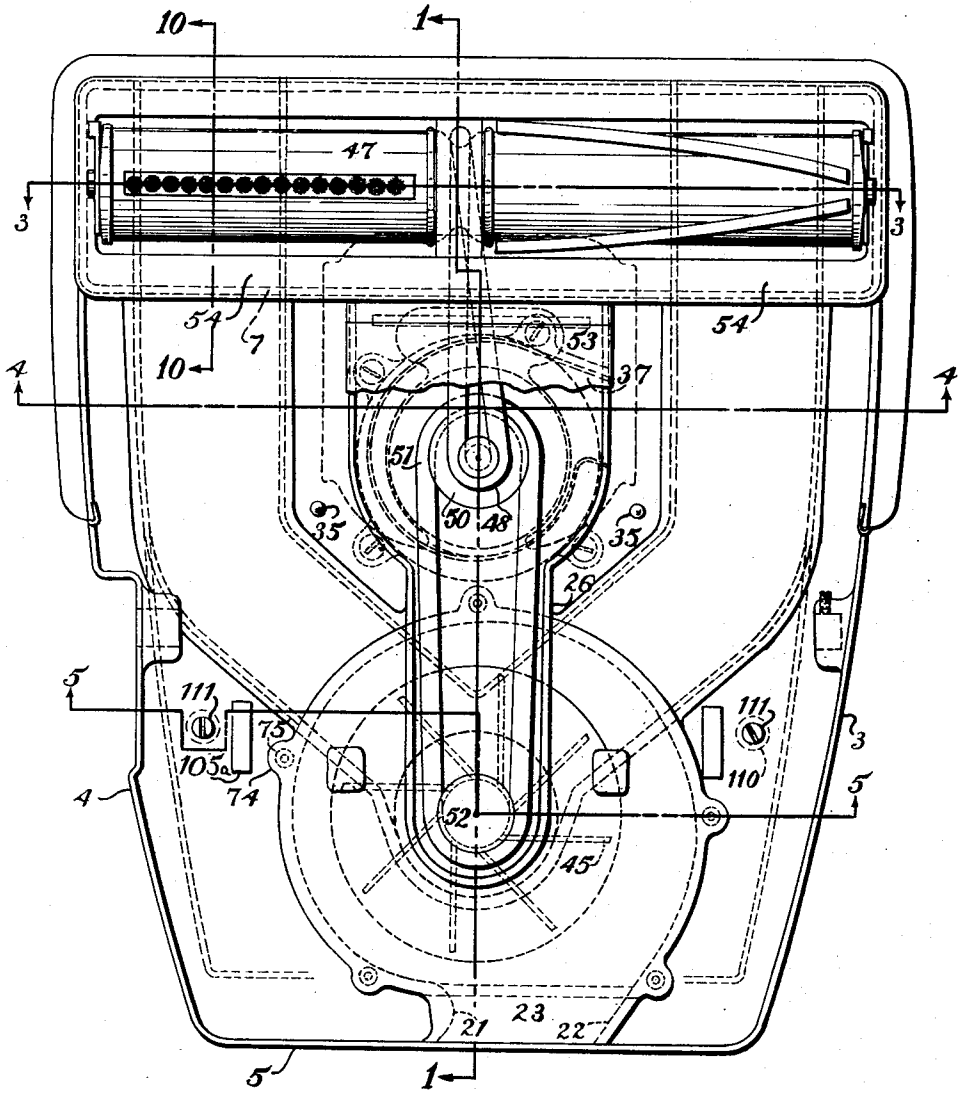

Fig. 2

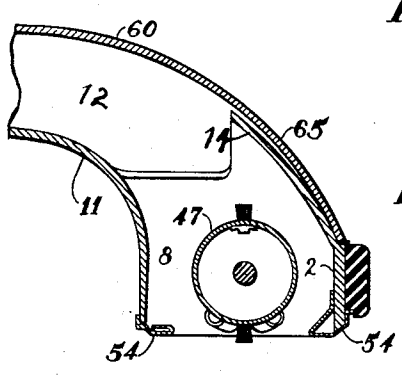

Fig. 10

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LOW HEIGHT SUCTION CLEANER

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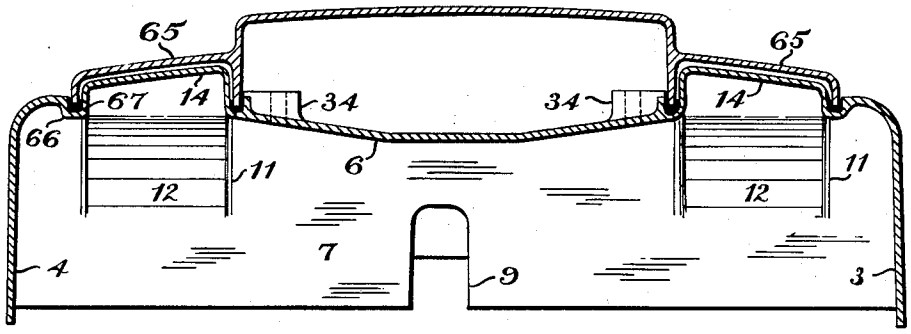

Fig. 3

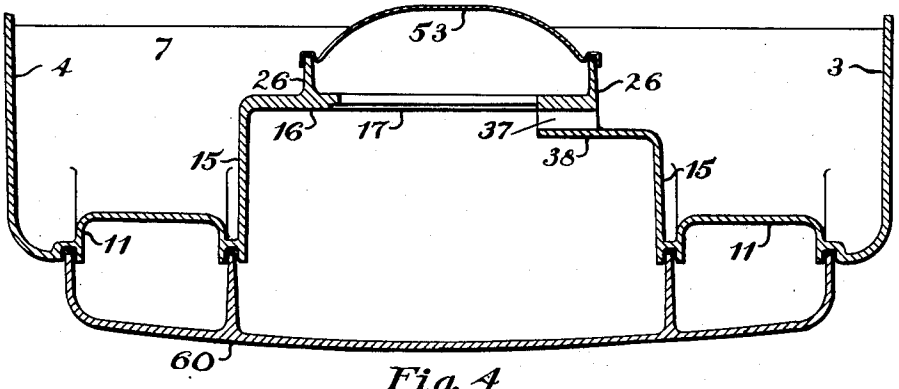

Fig. 4

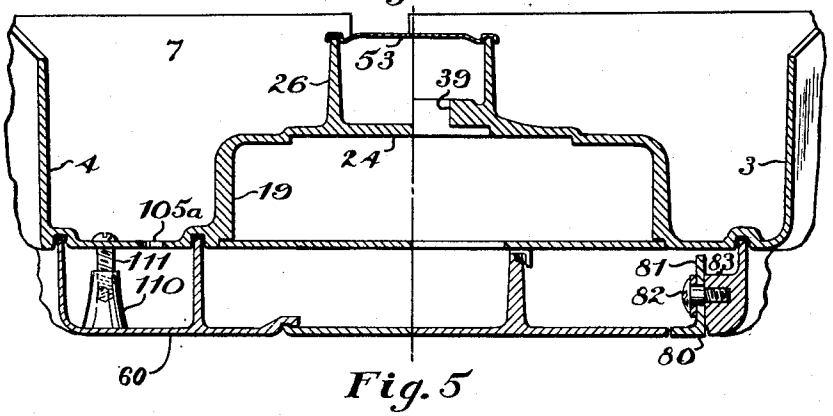

Fig. 5

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LOW HEIGHT SUCTION CLEANER

Filed May 26, 1951 6 Sheets-Sheet 4

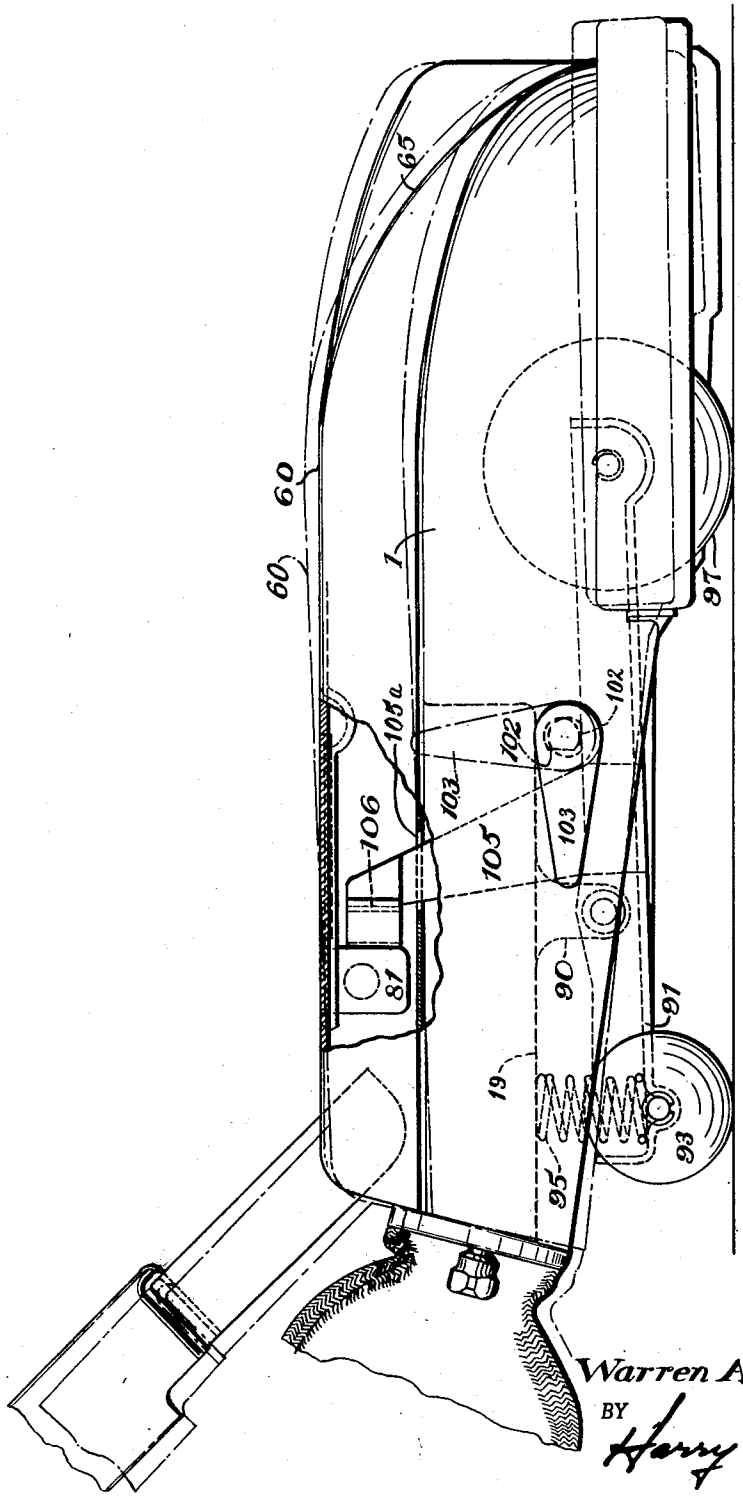

Fig. 6

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LOW HEIGHT SUCTION CLEANER

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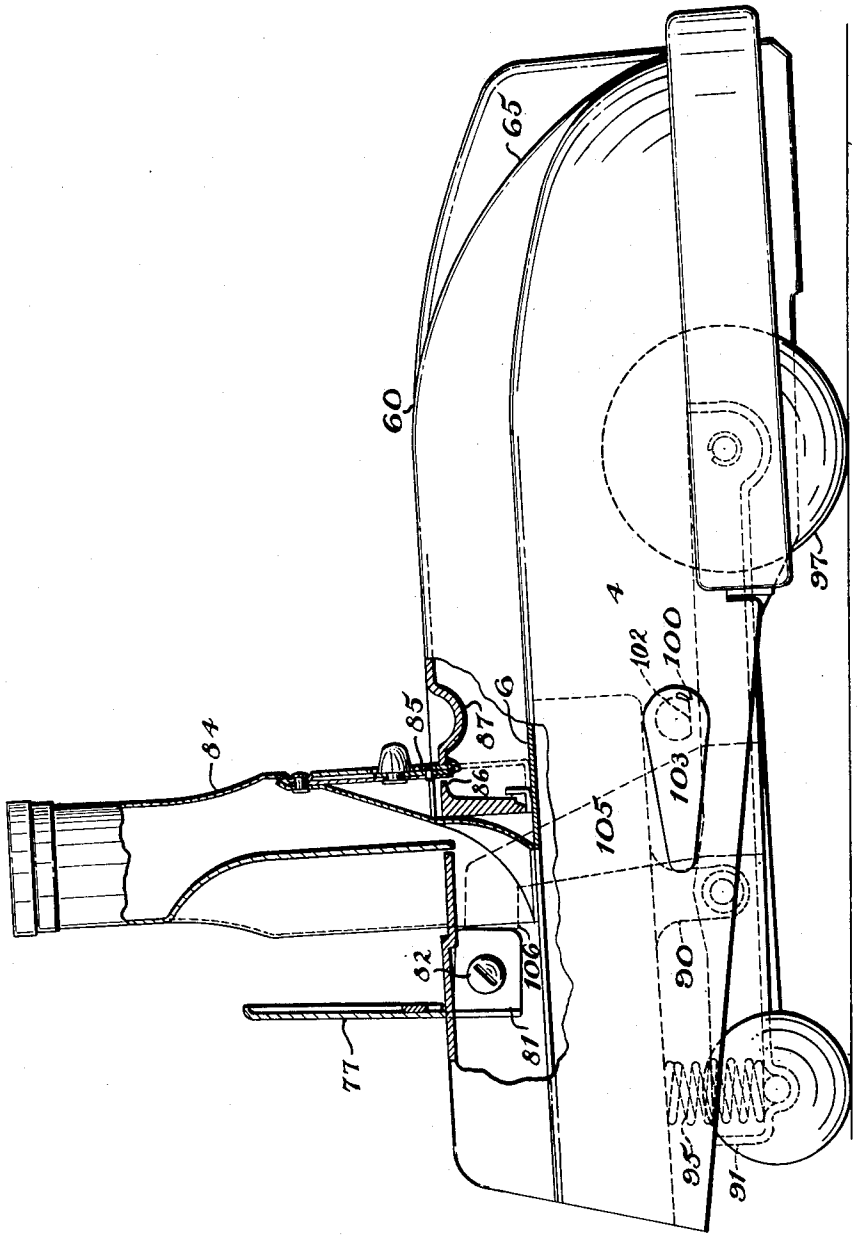

Fig. 7

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LOW HEIGHT SUCTION CLEANER

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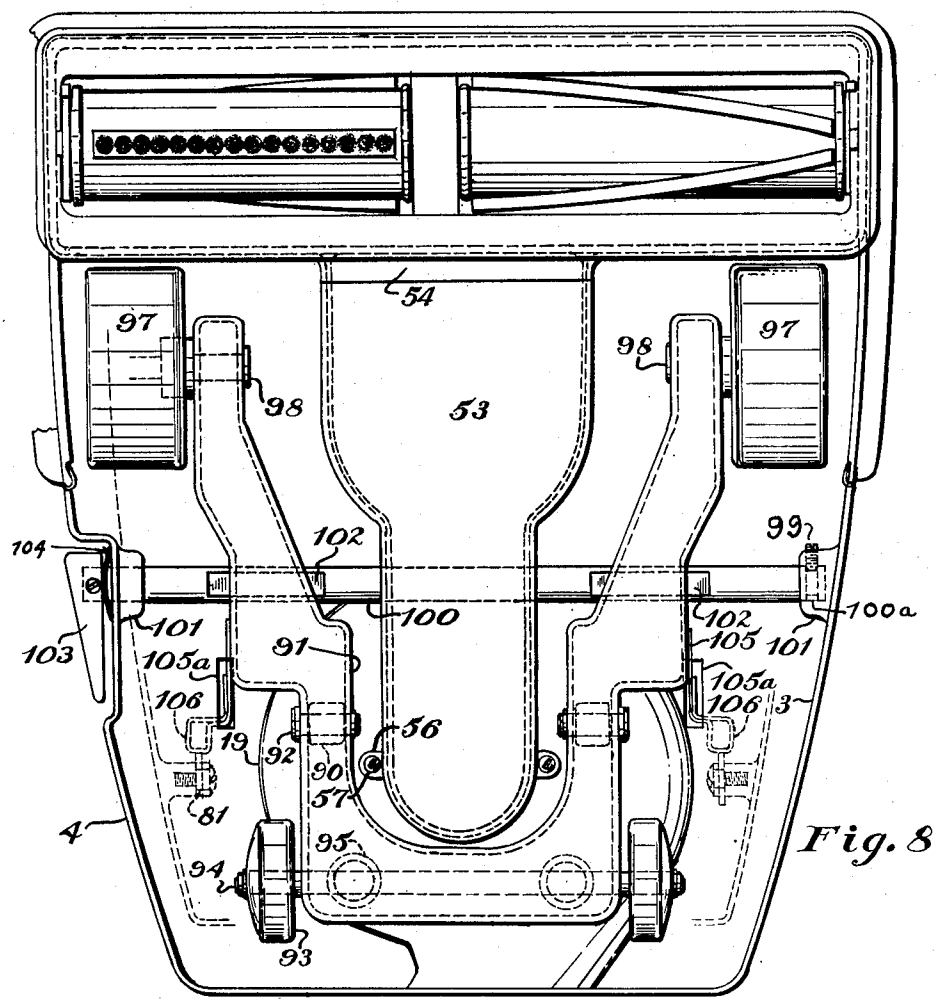

Fig. 8

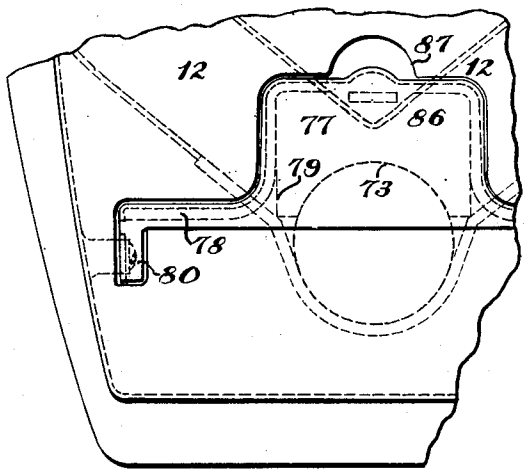

Fig. 9

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Patented Oct. 19, 1954

2,691,791

UNITED STATES PATENT OFFICE

2,691,791

LOW HEIGHT SUCTION CLEANER

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Application May 26, 1951, Serial No. 228,387

17 Claims. (Cl. 15—324)

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My invention relates to the art of suction cleaning apparatuses and particularly to a suction cleaning apparatus characterized by extraordinarily low height, simple top center conversion for off-the-floor cleaning arranged to be entirely clear of driving mechanisms for the fan and rotary surface agitating device, a simple supporting mechanism inter-connected with the converting mechanism so as to raise the nozzle to an elevated, inoperative position when the apparatus is conditioned for off-the-floor cleaning, and an arrangement by which all the major components of the apparatus are substantially in side-by-side relation so that the height of the cleaner is determined by the minimum height of the largest element thereof.

It is a particular object of my invention to provide a suction cleaning apparatus of the above described character characterized by a main frame member which may be a casting, having a series of upwardly and downwardly opening wells and channels which define or house all the operative elements of the cleaner.

It is a further object of my invention to provide a suction cleaner having a main frame as developed in the preceding paragraph which cooperates with a flat topped hood member serving to cover all the elements of the cleaner and to cooperate with certain of the parts of the main frame to complete the elements thereof.

It is a further object of my invention to provide a suction cleaning apparatus having a suction nozzle at its front end, a drive motor positioned for rotation on a vertical axis immediately to the rear of the nozzle and a high-speed suction fan positioned for rotation on a vertical axis immediately to the rear of the electric motor with the fan and motor axes lying on the longitudinal center line of the apparatus.

It is a further object of my invention to provide a suction cleaning apparatus having a suction nozzle incorporating a rotary surface agitating device, a motor positioned rearwardly of the nozzle and a high-speed suction fan positioned rearwardly of the motor, with nozzle to fan air ducts positioned adjacent the top wall of the cleaner structure, and a drive belt mechanism for driving the fan and agitator from the motor extending along the bottom side of the machine along the longitudinal center line of the apparatus.

It is a further object of the invention to provide a suction cleaner as characterized by the provision of air ducts rising from the nozzle adjacent the top portion of the machine on opposite sides of the motor and joining at the rear of the structure over the fan eye at a point convenient for top center insertion of a converting tool.

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Other objects and advantages of the invention will become apparent as the description proceeds when taken in connection with accompanying drawing in which:

Figure 1 is a side elevational view in cross section illustrating an apparatus embodying my invention but omitting the supporting structure and certain other parts for clarity in illustration;

Figure 2 is a bottom plan view of the apparatus shown in Figure 1 but also omitting the supporting structure;

Figure 3 is a sectional view taken along the line 3—3 of Figure 2 and looking in the direction of the arrows but confined to frame structure to illustrate the construction thereof without interference from mechanical parts;

Figure 4 is a view taken along the line 4—4 of Figure 2 looking in the direction of the arrows and inverted to line up corresponding sides of the figure with Figure 3;

Figure 5 is a view taken along the line 5—5 of Figure 2 looking in the direction of the arrows and inverted to line up corresponding sides of the figure with Figures 3 and 4;

Figure 6 is a side elevational view of the apparatus illustrating the supporting structure and its adjusting mechanisms with a portion of the structure broken away to illustrate an inter-locking mechanism between a conversion cover and the supporting structure;

Figure 7 is a view similar to Figure 6 illustrating a converter inserted into the apparatus with the supporting structure in conversion position;

Figure 8 is a bottom plan view of the apparatus shown in Figure 6;

Figure 9 is a partial top plan view of the apparatus shown in Figure 6; and

Figure 10 is a sectional view taken on the line 10—10 of Figure 2 looking in the direction of the arrows.

The cleaner comprises a main frame member, preferably a casting, illustrated most clearly in Figures 1 to 5, indicated generally by the reference character 1 and provided with front, side and rear walls 2, 3, 4 and 5, respectively, which merge into a top wall member indicated generally by the reference character 6. The front wall 2 and the side walls 3 and 4 cooperate with a wall 7 extending generally parallel to the wall 2 in spaced relation thereto to define a suction nozzle and agitator chamber 8. The top wall 6 of the

main casting defines the top wall of the nozzle chamber which has an open bottom in the usual manner. The wall 7 is provided with a central slot 9 to provide running space for a drive belt described hereinafter. The wall 7 has upwardly and rearwardly sloped channel sections 11 merging into the wall 7 at one end and into the top wall 6 adjacent a fan chamber to be described hereinafter. The channel shaped sections 11 define the bottom portion of air ducts 12 opening into the nozzle chamber 8. The top wall 6 is provided with inverted channel shaped wall sections 14, see Figures 3 and 10, overlying the wall sections 11 and forming the upper portion of the air ducts 12. The suction air ducts 12 open into the nozzle chamber 8 adjacent opposite ends thereof.

The top wall 6 of the main frame is interrupted rearwardly of the nozzle chamber 8 by a motor mounting well defined by a vertically extending chamber enclosing wall 15 merging into the wall 7 and terminating in a bottom flange member 16 defining an opening 17 for a purpose to be described hereinafter. The motor chamber defined by the wall 15 is divided by the longitudinal center line of the main frame.

The top wall 6 of the main frame is further interrupted rearwardly of the motor chamber by a vertical, volute shaped wall 19 defining a fan chamber. At the center of the machine, as shown in Figure 1, the walls 15 and 19 are common. The volute shaped wall 19 is non-continuous and terminates in vertical walls 21 and 22 piercing the rear wall 5 of the main casting defining the side walls of an exhaust outlet 23. The chamber defined by the wall 19 is closed at the bottom by a wall 24 forming the bottom of the fan chamber and the bottom portion of the exhaust passageway 23.

The main frame 1 is also provided with a downwardly projecting wall 26 extending from the rear face of the wall 7 on opposite sides of the slot 9 to a point adjacent the rear of the motor chamber where the two sections of the wall 26 curve inwardly to approach each other and then extend rearwardly in parallel relation to the center line of the fan chamber where they join a half-round section, thus cooperating with the flange 16 and wall 24 to form a closed end tunnel extending from the wall 7 to a point rearwardly of the center line of the fan chamber.

A housing 27, preferably of insulating material, encases an electric motor and seats in the chamber defined by the wall 15. The bottom portion of the housing 27 carries a metallic cup 28 defining a chamber for a motor ventilating fan 29 and seating in the opening 17 in the wall 16. A lower motor bearing 30 is secured in the cup 28 for supporting the armature and shaft of the motor. The housing 27 has a portion 31 housing the motor field core 32 and projecting beyond the confines of the motor chamber. The central portion of the wall 6, forming the upper wall of the nozzle 8, is depressed to accommodate the forwardly projecting field coil encasing section 31 of the housing 27. The motor casing and its appurtenant structures may be secured to the main frame structure by any suitable means. In the illustrated embodiment, the central portion of the top wall 6 over the nozzle is provided with bosses 34 having tapped holes therein and the bottom flange 16 of the motor chamber is also provided with a pair of tapped holes 35. The motor housing 27 is provided with suitable projecting feet, not shown, having bolt holes to coincide with the holes in the bosses 34 and the holes 35 to receive securing bolts.

The ventilating chamber formed by the cup 28 housing the motor ventilating fan 29 is provided with a discharge duct 37, see Figure 2, which, see Figure 4, is formed by a wall 16 and a humped-up wall section 38. In this way, ventilating air discharges from the casing 27 to the underside of the main frame of the machine.

The bottom wall 24 of the fan chamber is provided with an opening 39 through which an elongated bearing 40 extends. The bearing 40 is provided with a peripheral flange 41 resting in a cup 42 in the wall 24 and is secured thereto by suitable bolts 43. A fan shaft 44 is carried by the bearing structure 40 extending into the fan chamber and supports a suitable centrifugal fan 45 which is secured to the shaft 44 by a nut 46. The fan 45 is positioned in the fan chamber to discharge through the duct 23.

A rotary brushing and agitating device 47 is supported in a known manner in the nozzle chamber 8 in position to engage a surface covering drawn up to the nozzle mouth by suction. The agitator 47 is driven by a rubber belt 48 extending through the slot 9 in the wall 7 to engage around a small pulley 49 carried by the shaft of the drive motor. The motor shaft also carries a large pulley 50 integral with the pulley 49 and hollow so as to partially nest the motor bearing 30. The fan shaft 44 is drivingly connected to the pulley 50 by means of a rubber belt 51 engaging a pulley 52 on the fan shaft 44.

A plate 54 extends around the lower edges of the front wall 2, wall 7 and a portion of the side walls 3 and 4 defining the end walls of the nozzle chamber 8. The plate 54 defines the nozzle lips for the cleaner and extends a short distance rearwardly of the wall 7 engaging the lower edges of the side sections of wall 26. The remaining portion of the belt tunnel encompassed by the wall 26 is closed by a plate 53 engaging the lower edges of the wall 26 and provided with a tab 55 engaging over the rearwardly extending portion of the member 54. The plate 53 is provided with a pair of laterally projecting side wings 56, see Figure 8, which are attached to the underside of the main casting by means of bolts 57.

The upper portion of the machine is closed by a hood or casing indicated generally by the reference character 60. This casing has a downwardly extending front wall 61 provided with an elongated air receiving opening and light transmitting opening 62. The lower edge of the front wall 61 engages in a complemental cut-out section of the front wall 2 of the main frame as shown in Figure 1. The hood 60 extends over the entire main frame and has a downwardly projecting peripheral wall 63 at the rear engaging the upper edge of the main frame 1 at its rear portion. The hood 60 is provided with inverted channel sections 65 forming the lateral side sections thereof. The channel sections 65 extend along opposite sides of the motor housing and motor receiving chamber to the front of the main frame overlying the forward sections of the air ducts 12 and the sections 14 of the main frame to continue the air ducts 12 rearwardly of the motor housing. Rearwardly of the motor housing, the walls defining the air ducts 12 converge to a point overlying the center of the fan 45. The side walls defining the channel sections 65 engage in suitable channel sections 66 formed in the top wall 6 of the main frame and are

sealed therein by suitable gaskets or sealing compound indicated at 67. At the front of the machine, the channel sections 65 curve downwardly as shown in Figures 1, 6 and 7, following the contour of the forward section of the lower wall of the forward sections of the air ducts 12 so as to provide a smoothly curved air duct running from the upper portion of the nozzle chamber 8 to the plane of the top wall of the main frame, after which the air ducts extend along the top wall 6 of the main frame and converge at a point above the fan 45.

The downwardly curved front sections of the air ducts 65 leave the central portion of the hood projecting upwardly and forwardly at the front of the machine to provide a lamp chamber 68 above the depressed portion of the wall 6 and forwardly of the motor field winding structure 32.

The chamber 68 will have a suitable dirt finder lamp, indicated herein merely with dotted lines at 69, positioned to direct light rays through the opening 62. The motor housing 27 is provided with a cut-out portion 70 facing the lamp chamber 68 so the ventilating air may flow through the opening 62 over the lamp 69 and through the opening 70 over the field stack, the motor, the armature and through the motor housing to the ventilating fan 29. In this way, the heat generated by the lamp 69 and the electric motor is dissipated by heating the ventilating air which discharges through the duct 37 to the underside of the machine.

The top wall of the fan chamber is covered by a plate 72 having a central opening 73 coinciding with the junction point of the air ducts 12 and forming the inlet eye for the fan 45. The plate 72 is provided with a plurality of projecting ears 74 which are secured to the top wall of the main frame by bolts 75. The walls defining the portions of the air ducts above the fan are air sealed to the plate 72 by gaskets 72*a*.

The various sectional views contained in Figures 3 to 5 illustrate the manner in which the air duct forming sections 65 of the hood 60 gradually increase in height toward the rear of the machine until the hood 60 is substantially flat throughout its top extent.

The top wall of the hood 60 is provided with an opening 79 over the junction point of the two air ducts 12 and immediately forwardly of the fan eye opening 73 in the plate 72. This opening is for the purpose of receiving a tool for converting the apparatus for off-the-floor cleaning. The opening 79 is placed in a slightly depressed portion 76 of the hood 60 which receives a cover plate 77 for the opening 79 and permits the cover plate to lie flush with the top wall of the hood 60. The cover plate 77 has laterally extending side wings 78 provided with rearwardly projecting arms 80 which carry downwardly extending flanges 81 extending through suitable openings formed in the hood 60. The flanges 81, see Figure 5, are pivotally mounted on studs 82 threaded into enlarged bosses 83 on the underside of the hood 60. When the cover plate 77 is in the raised position, illustrated in Figure 7, a dusting tool converter, indicated at 84, may be inserted into the opening 79. The lower end of the converter tool 84 is shaped to fit snugly in the opening 79 and to extend down to the top wall 6 of the main frame so as completely to cut off communication between the ducts 12 and the fan eye 73. The dusting tool carries a suitable spring latch indicated generally at 85, adapted to extend through a latch opening 86 in the hood 60 just forwardly of the junction point of the ducts 12. The spring latch is of a well-known manual pressure release type and serves to secure the dusting tool in operative position in the cleaner when such a device is utilized. The top wall of the hood 60 is provided with a depressed finger receiving portion 87 just forwardly of the opening 86 in order to permit the operator to insert a finger under the forward end of the cover 77 for the purpose of moving the same to the open position illustrated in Figure 7.

Referring now particularly to Figures 6 to 8, the underside of the main frame 6 beneath the fan chamber 19 is provided with a pair of downwardly projecting bosses 90 on opposite sides of the center line of the machine. These bosses are received within the legs of a U-shaped wheel supporting frame 91 which is channel-shaped in cross section. Pivot pins 92 extend through the side wall portion of each leg of the wheel supporting frame 91 and the bosses 90 to secure the wheel frame to the main frame in pivotal relationship. A pair of spaced rear supporting wheels 93 are pivotally mounted on a shaft 94 carried by the rear portion of the frame 91. Suitable compression springs 95 are mounted to bear between the frame 91 over the axle 94 and the underside of the fan chamber 19, thus tending to force the wheels 93 away from the main frame of the cleaner. The forward end of each leg of the U-shaped frame 91 rigidly supports a stub-shaft 98 which carries a large wide tread front supporting wheel 97 underlying an air duct 12 just rearwardly of the suction nozzle. It is apparent from the foregoing that the springs 95 tend to pivot the cleaner body and its associated mechanism about the pins 92 to lower the nozzle towards the supporting surface. An adjusting shaft 100 is journalled in large bosses 101 projecting inwardly from the opposite side walls 3 and 4 of the main frame 1. This shaft is provided with two flats 102 over the legs of the frame 91. The shaft 100 extends through wall 4 and supports a lever 103 on its end. A set screw 99 in one boss 101 engages in a groove 101*a* in the shaft to prevent lateral displacement thereof. A spring washer 104 bears between lever 103 and wall 4 to retain the shaft in adjusted position frictionally. When the lever 103 is in the dotted line position of Figure 6, the rounded portion of the shaft 100 bears on the frame 91 lowering the front wheels and raising the nozzle to its high or thick carpet cleaning position shown by dashed lines in Figure 6. When the lever 103 is lowered to the full line position of Figure 6, the flat section 102 engages the frame 91 which allows the nozzle to be lowered to its low range or thin carpet adjusted position shown solid in Figure 6.

The frame 91 is provided with projecting arms 105 forwardly of the pivot pins 92. The upper ends of the arms 105 extend through openings 105*a* in the wall 6 and are provided with return bent portions 106 positioned to be engaged by the flanges 81 on the converter cover plate 77. As shown in Figure 6, the parts 106 engage the flanges 81 when the nozzle is in its lowermost position. When the arm 103 is adjusted to the dotted line position of Figure 6, there is a slight clearance between the members 81 and 106. When the cover plate 77 is raised, the flanges 81 bear upon the members 106 to rock the frame 91 in a clockwise direction, as viewed in Figure 6,

thus lowering the wheels 97 with respect to the main frame and raising the nozzle to a high, inoperative position which will render the rotary agitator inoperative during off-the-floor cleaning operation. This condition of the apparatus is illustrated in Figure 7, from which it is apparent that the nozzle is held in inoperative position when the converting tool 84 is in its operative position. The adjustment of the lever 103 has no effect upon the inter-action between the members 81 and 105, and vice versa. Whatever the adjusted position of the member 103, the action of the members 81 upon the frame 91 is the same and the machine returns to its adjusted position as determined by the lever 103 as soon as the cover 77 is returned to closed position.

The hood 60 is provided with a pair of depending bosses 110 positioned laterally of the air ducts 12 and the fan chamber. The bosses 110 overlie suitable openings in the wall 6 and receive securing studs 111 which pass through the wall 6 from the bottom and thread into the bosses 110 to pull the hood 60 into firm engagement with the main frame.

The suction cleaning apparatus described above is particularly characterized by extreme low height, the maximum height of the machine being determined by the maximum height of the individual elements therein, namely the electric drive motor. The longitudinal center line of the machine forms the longitudinal center line dividing the air conduits which rise upwardly from the nozzle adjacent the ends thereof over the front supporting wheels. The rotational axes of the fan and drive motor structure lie on the longitudinal center line of the main frame. It is also apparent that the space immediately above the nozzle provides a chamber for housing the dirt finder lamp, a chamber for the motor field winding and a ventilating air passageway to permit ventilating air to enter the front of the machine and flow over the lamp and field coil and then through the motor housing. The drive mechanism is housed in a tunnel at the underside of the machine and constitutes a pair of belts extending in opposite directions from the drive motor which subject the bottom motor bearing to belt pulls in diametrically opposite directions; hence this element is largely relieved of heavy wear due to belt tension. The bottom tunnel belt drive arrangement produces another advantage in that the motor can be constructed to run at the highest speed feasible for driving the rotary agitator in the nozzle and the fan can be a small high-speed type which rotates at a higher speed than the motor as is illustrated in the drawing wherein the motor drive pulley has a greater diameter than the fan pulley 52.

The main frame of the machine is a single element which forms the nozzle, motor chamber, fan chamber, portions of the air ducts and belt tunnel and cooperates with a single additional casting or frame member which completes the air ducts, forms the converter air duct port and closes all portions of the apparatus at the top to form a dirt finder lamp chamber and motor field stack ventilating channel. The present design has been found to permit reduction of the overall height of the cleaner by almost one-third as compared with more conventional designs in which the motor and fan are in vertically juxtaposed relationship with the suction fan carried by the motor shaft.

I claim:

1. Suction cleaning apparatus comprising a frame structure defining a suction air cleaning nozzle across the front thereof, a surface agitating device rotatably mounted in said nozzle, a suction air fan having an upwardly facing air inlet portion mounted on said frame for rotation about a vertical axis, an electric motor mounted on said frame for rotation on a vertical axis, said motor and said fan being positioned on said frame in side-by-side relationship with their axes on the longitudinal center line of said frame structure and said motor between said fan and said nozzle, means forming an enclosed tunnel on the underside of said frame extending from said nozzle to a point rearwardly of the axis of said fan, a pair of drive pulleys on said motor positioned in said tunnel, a pulley on said fan in said tunnel, a drive belt in said tunnel extending between one of said motor pulleys and said fan pulley, and a second belt in said tunnel extending between said surface agitating device and the other of said motor pulleys, means in said frame forming a pair of air ducts extending from said nozzle upwardly on opposite sides of said motor to said fan inlet portion and merging adjacent to said fan inlet position, means in said frame forming a converter tool inlet to provide for insertion of a converter tool through the top of said frame into blocking relation to said air ducts.

2. A suction cleaner main frame member comprising a top wall member having depending front and side walls, a depending wall on said frame member spaced rearwardly of and in parallel relation to said depending front wall to form a suction air cleaning nozzle chamber therewith and a depressed front central section of said top wall, means forming a motor chamber depending from said top wall rearwardly of said nozzle chamber, means forming a fan chamber depending from said top wall rearwardly of said motor chamber and having an upwardly facing air inlet opening, means forming air ducts rising from said nozzle chamber on opposite sides of said depressed portion of said top wall and said motor chamber, a closure member overlying and secured to said frame, said closure member having portions connected to said air ducts and engaging said top wall to form continuations of said air ducts extending rearwardly of said motor chamber to said air inlet, said closure member having downwardly curved sections at each side thereof at the front overlying and concealing the air duct forming portions of said main frame and a central section overlying said depressed central portion of said main frame top wall to form a lamp chamber air duct therewith.

3. A suction cleaner main frame member comprising a top wall member having depending front and side walls, a wall member depending from said top wall in spaced relation to said front wall member to form a downwardly opening nozzle chamber therewith, wall members forming upwardly opening motor and fan chambers depending below said top wall member rearward of said nozzle chamber along the longitudinal center line of said main frame member, said motor chamber being positioned between said nozzle chamber and said fan chamber, upwardly opening channel shaped depressions in said top wall member merging therewith at a point adjacent said fan chamber and extending forwardly along opposite sides of said motor chamber and gradually increasing in depth until such channel shaped depressions extend through the rear wall

of said nozzle chamber, and a wall member depending from the undersides of said members forming said fan and motor chambers extending from said rear nozzle wall member along opposite sides of the center line of said main frame member to a point beyond the center of said fan chamber and terminating in a curved section joining the two portions of said wall on opposite sides of said center line.

4. A suction cleaner comprising a frame defining a suction air cleaning nozzle at its front, a motor on said frame rearwardly of said nozzle mounted for rotation on a vertical axis, a hood having a substantially horizontal top wall over said frame and closely adjacent the top of said motor, a fan having an upwardly facing air inlet mounted on said frame below said hood and rearwardly of said motor for rotation on a vertical axis, means in said hood and said frame forming air ducts rising from said nozzle and extending on opposite sides of said motor to said fan air inlet beneath said top wall of said hood, and drive means operatively connecting said motor to said fan on the underside of said frame below the level of said air ducts.

5. In a suction cleaner, a frame structure having a downwardly facing suction air nozzle at the front thereof, an electric motor and a suction air fan mounted in said frame for rotation on vertical axes on the longitudinal center line of said frame rearwardly of said nozzle, said motor being positioned between said fan and said nozzle, said frame structure including an exhaust duct for said fan directed rearwardly of said frame structure and means forming air ducts extending rearwardly from opposite ends of said nozzle and on opposite sides of said motor to said fan, and means drivingly connecting said motor and said fan.

6. Apparatus according to claim 5 in which said motor includes a field structure having a wound portion extending forwardly of said frame structure between said air ducts over said nozzle, a lamp is mounted in said frame structure at the front thereof between and below the top portions of said air ducts, and said motor includes means for blowing cooling air over said field structure and said lamp.

7. Apparatus according to claim 5 including a rotary surface cleaning element rotatably mounted in said nozzle, means on said frame structure forming a belt tunnel extending beneath said fan and said motor to said nozzle and lying between said air ducts, said drive means including a drive belt in said tunnel, a second drive belt in said tunnel drivingly connecting said motor and said rotary cleaning element, a support frame underlying said frame structure and pivotally attached thereto, said support frame having a pair of arms extending forwardly beneath said frame structure on opposite sides of said belt tunnel, front wheels on the forward ends of said arms positioned under said air ducts, rear wheels on said support frame, spring means biasing said frame structure for pivotal movement on said support frame, and adjustable stop means for adjustably limiting pivotal movement of said main frame on said support frame to fix the cleaning position of said nozzle relative to a supporting surface.

8. Apparatus according to claim 7 including means in said frame structure forming a converter port opening through the top of said frame structure to said fan, a cover for said converter port mounted on said frame structure for movement to open and closed positions, means extending between said support frame and said cover laterally of said air ducts for pivoting said frame structure to raise said nozzle and said rotary cleaning device to an inoperative position when said cover is moved to open position.

9. In a suction cleaner, a one piece frame member having a top wall having front and side walls depending therefrom, a wall depending from said top wall rearwardly of said front wall to form an open bottom nozzle chamber therewith, a pair of open top wells depending from said top wall on the longitudinal center line of said frame member forming a motor chamber rearwardly of said nozzle chamber and a fan chamber rearwardly of said motor chamber, channels depressed below said top wall opening into opposite ends of said nozzle chamber and extending rearwardly therefrom on opposite sides of said motor chamber, said channels decreasing in depth from said nozzle chamber and merging into said top wall adjacent said fan chamber, a flat topped hood overlying said frame member and having a downwardly extending front portion merging into the front wall of said frame member, spaced pairs of depending ribs depending from said hood and each pair engaging said frame on opposite sides of one of said channels to form an air duct therewith, said ribs merging together around the central portion of said fan chamber to form an air inlet chamber common to said air ducts, a fan mounted in said fan chamber for rotation on a vertical axis, and a motor mounted in said motor chamber for rotation on a vertical axis and drivingly connected to said fan.

10. Apparatus according to claim 9 in which the portion of said top wall positioned between said channels and forwardly of said motor chamber is depressed to form a lamp chamber with said hood and a lamp mounted in said lamp chamber between said air ducts and below said hood.

11. Apparatus according to claim 9 in which said motor has a field structure provided with a wound portion projecting forwardly of said motor chamber into said lamp chamber between said air ducts and rearwardly of said lamp.

12. Apparatus according to claim 9 including a rotary surface cleaning member mounted in said nozzle chamber, walls on said frame depending below said motor and fan chambers forming a belt tunnel extending from said nozzle to said fan chamber.

13. In a suction cleaner, a frame structure having a downwardly opening suction air nozzle extending across the front thereof and an upwardly opening suction air fan chamber positioned rearwardly of said nozzle in spaced relation thereto on the longitudinal center line of said frame structure and having a rearwardly directed air discharge conduit, a suction air fan mounted in said fan chamber for rotation about a vertical axis on the longitudinal center line of said frame structure, an electric motor mounted on said frame structure between said fan and said nozzle for rotation on a vertical axis on said longitudinal center line, said frame structure including means forming air ducts extending from said nozzle rearwardly and upwardly on opposite sides of said motor to the upwardly facing opening of said fan chamber, and means drivingly connecting said motor and said fan.

14. Apparatus according to claim 13 including a rotary surface cleaning member mounted in said nozzle, a belt tunnel on the underside of said

frame structure between said air ducts extending from a point rearwardly of the axis of said fan to said nozzle, said drive means is a belt in said tunnel between said motor and said fan, and a belt in said tunnel drivingly connecting said motor and said rotary cleaning member.

15. Apparatus according to claim 14 including a U-shaped member pivotally attached to the underside of said frame structure with the bight portion of said U-shaped member positioned rearwardly of said belt tunnel and the legs of said U-shaped member extending on opposite sides of said belt tunnel beneath said air ducts, rear supporting wheels attached to the bight portion of said U-shaped member, and front supporting wheels attached to the front portion of said U-shaped member.

16. In a suction cleaner, a one piece main body member having a substantially plane top wall and depending front and side walls, a transverse wall depending from said body member in spaced relation to said front wall to define an open bottom nozzle chamber therewith, a pair of open top wells depending from said top wall rearwardly of said nozzle chamber along the longitudinal center line of said main body member, a pair of upwardly opening channels depending from said top wall, said channels extending from opposite ends of said nozzle chamber rearwardly

on opposite sides of the forward one of said wells and progressively decreasing in depth to merge into said top wall adjacent the rear of said wells.

17. Apparatus according to claim 16 including a hood having a substantially flat upper surface overlying said main body in spaced relation thereto and having a downwardly curved front merging into the front wall of said main body, depending walls on the underside of said hood engaging said main body and forming channels mating with the channels in said main body to form air ducts therewith, said depending walls on said hood decreasing in depth toward the front of said hood and merging at their rear ends to form an air inlet chamber over the central portion of the rear of said wells.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,533,806	Parker	Apr. 14, 1925
1,660,331	Frantz	Feb. 28, 1928
2,257,555	Troxler	Sept. 30, 1941
2,287,911	Snyder	June 30, 1942
2,345,623	Oaks	Apr. 4, 1944
2,517,670	Humphrey	Aug. 8, 1950
2,540,178	Smith	Feb. 6, 1951
2,575,554	Langille	Nov. 20, 1951