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WHEEL ASSEMBLY FOR VACUUM CLEANER

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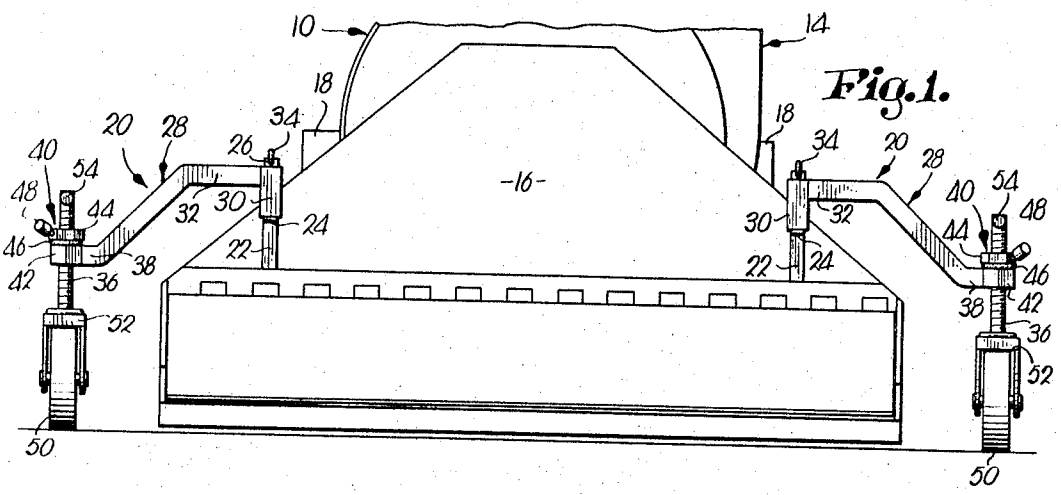


Fig.1.

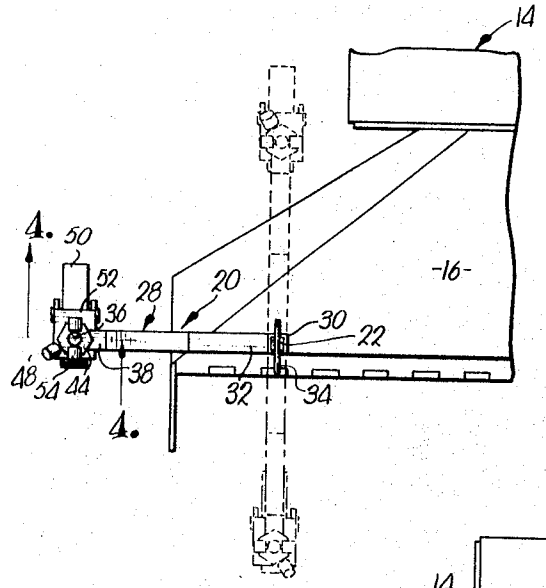
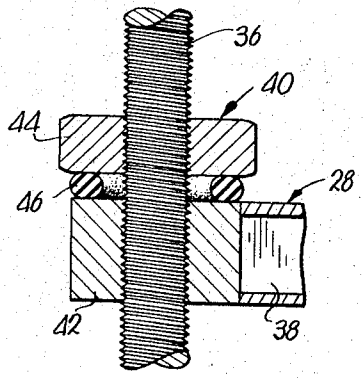


Fig.2.

Fig.4.



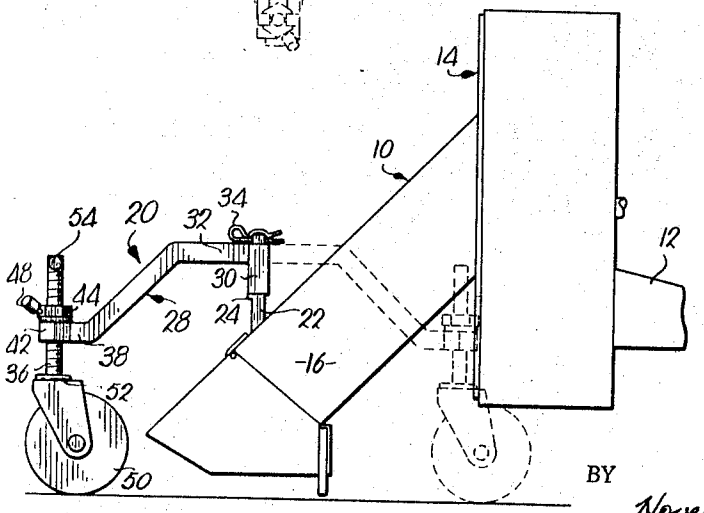


Fig.3.

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WHEEL ASSEMBLY FOR VACUUM CLEANER

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This invention relates to the provision of structure for permitting coupling of the forward support wheels of a vacuum cleaner so that they may be positioned forwardly, rearwardly or laterally of the nozzle structure of the vacuum.

It is the primary object of the instant invention to provide a wheel assembly for a vacuum cleaner wherein the positions of the wheel units thereof supporting the nozzle portion of the vacuum may be easily changed to enhance the versatility and utility of the vacuum cleaner.

It is another important object of this invention to provide support structure capable of adapting an industrial vacuum cleaner to inside uses where mobility is relatively restricted due to machinery and the like while also providing for optimum outside use over relatively rough surfaces.

An important object of our present invention is to incorporate the aforesaid advantages in a wheel assembly for a vacuum cleaner, while at the same time providing mechanism for height adjustment of the vacuum with respect to the surface to be cleaned for picking up various types of material and protecting the nozzle structure from damage on rough surfaces.

A further object of the present invention is the provision of a wheel assembly of the aforementioned character which includes readily releasable structure for easily shifting the wheel units to their various operative positions and for positively locking the same against rotation when the units are in predetermined positions.

In the drawing:

FIGURE 1 is a fragmentary, front elevational view of a vacuum cleaner showing a wheel assembly made pursuant to our present invention;

FIG. 2 is a fragmentary, top plan view of the vacuum cleaner showing the forward and rearward operating positions of a wheel unit in dashed lines;

FIG. 3 is a fragmentary, side elevational view of the vacuum cleaner showing the forward position of a wheel unit in full lines and the rearward position thereof in dashed lines; and

FIG. 4 is an enlarged, cross-sectional view taken along line 4—4 of FIG. 2.

The present invention is primarily designed for use with a heavy-duty, industrial vacuum cleaner broadly designated by the reference numeral **10** and shown fragmentarily in the drawing. Vacuum cleaner **10** includes a frame **12** having a fan housing **14** at its forward end, fan housing **14** terminating in a downwardly and forwardly extending, transversely elongated nozzle **16**. Support means for vacuum cleaner **10** includes a pair of rear wheel and axle assemblies **18** mounted on frame **12**, and a pair of caster unit assemblies **20** embodying the principles of this invention. Assemblies **20** are mounted on nozzle **16** adjacent each outermost and forwardmost end respectively of the nozzle.

Each caster unit **20** includes an upstanding square post **22** rigidly secured to nozzle **16** at a point near the respective outer edge of the nozzle. A projection **24** extends outwardly from the upright surface and intermediate the ends of post **22**. A transversely extending cotter key opening **26** is provided near the uppermost end of post **22**.

A generally Z-shaped arm **28** extends laterally from post **22** and is attached thereto by releasable structure in

the form of a square sleeve **30** rigidly secured to one end **32** of arm **28**. The inner surfaces of sleeve **30** complementally engage the outer surfaces of post **22** as sleeve **30** is telescoped over post **22**. The longitudinal length of sleeve **30** is substantially equal to the distance between projection **24** and cotter key opening **26** whereby sleeve **30** may be locked on post **22** by telescoping the same downwardly thereon until the lower edge of sleeve **30** abuts projection **24**. A cotter key **34** is then installed through opening **26**.

An upstanding, screw-threaded standard **36** is secured to the outermost end **38** of arm **28** by releasable mechanism, generally designated by the numeral **40**. Mechanism **40** includes a primary nut **42** rigidly secured to arm **28** at its outermost end **38** and threadably engaging standard **36**. Releasable mechanism **40** further includes a locknut **44** threaded on standard **36** above primary nut **42** and a locking O-ring **46** received on standard **36** between locknut **44** and primary nut **42**. A finger **48** is rigidly secured to locknut **44** and extends laterally therefrom to provide means for manually releasing nut **44** without the need for auxiliary tools.

A caster wheel **50** is attached to the lowermost end of standard **36** by swivel means **52** which permits free rotation of wheel **50** about the vertical axis of standard **36**.

In use, the caster wheel units **20** will be disposed in one of the three positions shown in FIG. 2. For example, wheel **50** may be disposed laterally of nozzle **16** as shown in the full-line position of FIG. 2, and if it is desired to move wheel **50** to either of the dashed-line positions of FIG. 2, cotter key **34** is removed from opening **26** and arm **28** lifted upwardly to release sleeve **30** from post **22** whereby it may then be rotated 90° in either direction to be re-telescoped onto post **22** and locked thereon by re-insertion of cotter key **34**. Therefore, it will be appreciated that wheel **50** has three preselected positions corresponding to the possible fittings of square sleeve **30** on square post **22**. Wheel **50** may be positioned rearwardly of nozzle **16** since the latter extends outwardly and downwardly from fan housing **14** as shown best in FIG. 2, leaving a space for receiving wheel **50** and its corresponding arm **28**.

Since wheels **50** may be quickly and easily placed in preselected positions with respect to the nozzle by our novel mechanism, vacuum cleaner **10** is adapted for a variety of uses. By positioning wheel **50** rearwardly or forwardly of nozzle **16**, the over-all width of vacuum cleaner **10** will be minimized to allow accessibility of vacuum cleaner **10** to relatively narrow spaces such as presented by aisles and passages around crates and the like in industrial plants.

If wheels **50** are positioned rearwardly or laterally of nozzle **16**, vacuum cleaner **10** is then also well adapted for vacuuming surfaces adjacent walls or the like since the forward edge of nozzle **16** can then be moved into close proximity to a wall. This would be impossible if wheels **50** were positioned forwardly of nozzle **16**. Thus, when the vacuum cleaner is being used for inside work over relatively smooth surfaces positioning of the front wheels rearwardly of the nozzle obtains both of the foregoing advantages and obtains the best possible cleaning results.

It is, however, often desired to use the industrial vacuum cleaner outside of a building such as in streets, alleys, and on lawns or other unpaved areas for collecting cans, leaves and other debris. For such operations, the vacuum cleaner must move over relatively rough surfaces and often irregular terrain. In such case, if the front wheels were positioned rearwardly of the nozzle, the latter would not be supported from hitting raised portions of the surface or digging into the surface or the

ground when the vacuum cleaner is moved over a depression, hole or the like. Our assembly obviates this disadvantage by allowing shifting of each of the wheels **50** forwardly or laterally of nozzle **16** as desired, whereby the latter will then be better supported for movement upwardly or downwardly with the wheels as they encounter such depressions or raised portions in the surface over which the cleaner must operate. Again, if it is desired to move the forward edge of nozzle **16** in close proximity to a wall, yet the roughness of the terrain requires support for the nozzle further forward than is provided when the wheels **50** are in their rearmost positions, wheels **50** should be positioned laterally rather than forwardly of nozzle **16**. This permits operation of nozzle **16** up against and near to obstructions, yet supports the nozzle to prevent it from digging into the ground.

Thus, it will be appreciated that a vacuum cleaner with our wheel assembly is a highly versatile machine, easily and quickly adapted for use either inside or outside of buildings, as well as for cleaning surfaces in close proximity to walls or other obstructions. Wheels **50** may be positively locked in any one of three preselected positions, each required for certain operational conditions, due to the novel square sleeve and post design which precludes rotational slipping of the sleeve on the post as the vacuum cleaner is used.

Releasable mechanism **40** is provided so that nozzle **16** of vacuum cleaner **10** may be adjusted in height with respect to the surface being cleaned whereby the vacuum cleaner will be adapted to clean surfaces covered with various types and sizes of material and also to compensate for the relative roughness of the surface being cleaned.

To operate mechanism **40**, locknut **44** is loosened from primary nut **42** by manually applying pressure to finger **48** to rotate locknut **40** on standard **36**. If it is desired to lower nozzle **16** of vacuum cleaner **10** with respect to the surface therebeneath, locknut **44** must be rotated to move upwardly by an increment substantially equal to the desired lowering of nozzle **16**. The exact increment of movement of locknut **44** will vary slightly, depending upon the particular position of wheel **50**. Standard **36** is then rotated within primary nut **42** until the latter is tightened against locknut **40** with O-ring **46** clamped therebetween. A knob **54** may be provided at the uppermost end of standard **36** for conveniently rotating the same.

The importance of O-ring **46** to the high degree of flexibility of operational characteristics of the vacuum cleaner should not be overlooked. The compressibility of the O-ring between nut **42** and locknut **44** provides the frictional engagement which secures the nuts against relative rotation and against rotation on standard **36**. Yet, this tight frictional lock can be achieved manually by the operator of cleaner **10** without any need whatsoever for wrenches or other hand tools. This permits the operator to change, during cleaning operations, the vertical adjustment of wheels **50** with respect to the nozzle to adapt the cleaner to the terrain and to achieve the best possible cleaning results. Further, such frictional engagement, because of the compressibility of O-ring **46**, is easily disengaged by the operator for re-adjustment, again with no necessity for tools.

To raise nozzle **16** of vacuum cleaner **10**, locknut **44** is loosened from primary nut **42** and standard **36** is then rotated to cause primary nut **42** to move downwardly thereon. Locknut **44** is then rotated to move the same downwardly until it clamps against primary nut **42** with

the O-ring therebetween, the O-ring frictionally engaging both nuts and also possibly being squeezed to engage the standard **36**. It will be appreciated that locknut **44** cannot inadvertently work loose during use of the vacuum cleaner because of this frictional engagement.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a vacuum cleaner provided with a number of wheel and axle assemblies supporting the same and having a fan housing terminating in a downwardly and forwardly extending, transversely elongated nozzle, said assemblies including a caster wheel unit adjacent each outermost and forwardmost end respectively of said nozzle, each unit including:

an upstanding post rigid to the nozzle;

an arm extending laterally from the post;

an upstanding standard secured to the outermost end of the arm;

a caster wheel at the lowermost end of the standard;

means attaching the wheel to the standard for swiveling movement about the vertical axis of the standard; and

releasable structure attaching the arm to the post in a number of positions therearound whereby the caster wheel may be selectively positioned forwardly, rearwardly or laterally of the nozzle.

2. The invention of claim **1**, said structure including:

a sleeve on the post,

said sleeve and said post having complemental interengaging polygonal surfaces.

3. In a vacuum cleaner provided with a number of wheel and axle assemblies supporting the same and having a fan housing terminating in a downwardly and forwardly extending, transversely elongated nozzle, said assemblies including a caster wheel unit adjacent each outermost and forwardmost end respectively of said nozzle, each unit including:

an upstanding post rigid to the nozzle;

an arm extending laterally from the post;

an upstanding standard at the outermost end of the arm;

a caster wheel at the lowermost end of the standard;

means attaching the wheel to the standard for swiveling movement about the vertical axis of the standard;

releasable mechanism for securing the arm to the standard in any number of preselected positions along the vertical length of the standard; and

releasable structure attaching the arm to the post in a number of positions therearound whereby the caster wheel may be selectively positioned forwardly, rearwardly or laterally of the nozzle.

4. The invention of claim **3**, said mechanism including:

a primary nut rigid to the arm;

said standard being screw-threaded into the unit;

a locknut on the standard; and

a locking ring on the standard clamped between the nuts.

References Cited

UNITED STATES PATENTS

2,193,784	3/1940	Smith	15—340
2,824,335	2/1958	Moffat	15—354 X
3,184,777	5/1965	Norden	15—354 X

FOREIGN PATENTS

767,420	2/1957	Great Britain.

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