United States Patent

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[54] **STEERING ATTACHMENT FOR SWIMMING POOL VACUUM HEAD**
10 Claims, 3 Drawing Figs.

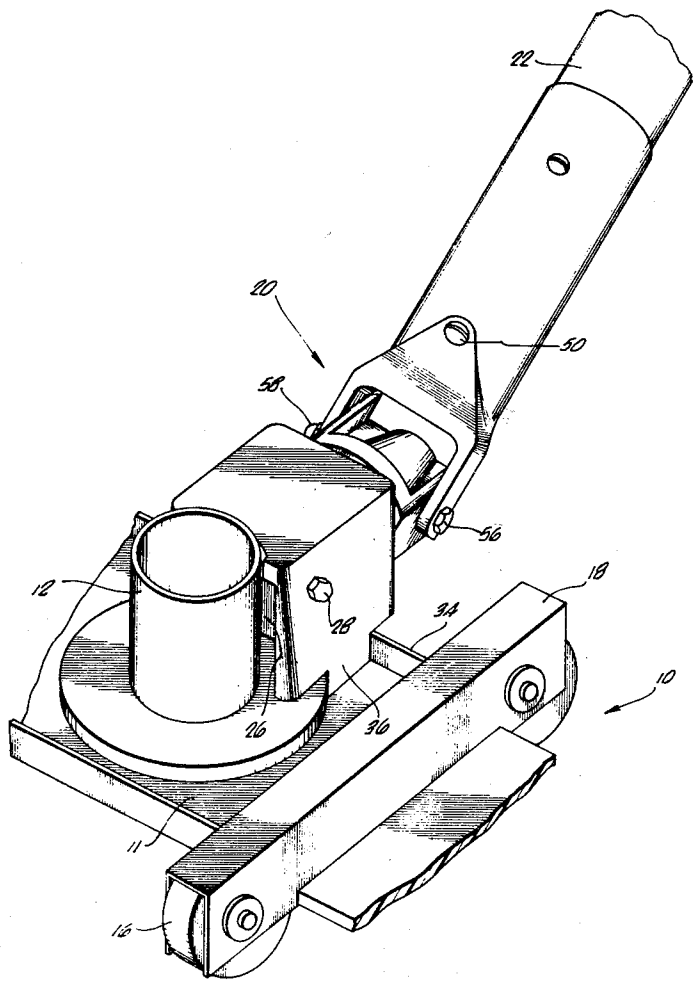
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[51] **Int. Cl.** **B62b 5/06;** A47l 9/32
[50] **Field of Search** 280/47.11, 47.34; 15/1.7, 410, 411, 144; 64/4, 17; 287/100; 180/19

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ABSTRACT: For a swimming pool vacuum cleaner head, a steering attachment with a swivel for steerably connecting an elongate pole to the head. The pole concurrently rotates about the swivel and rotates with the swivel such that the vacuum head can be steered about the pool surface by concurrently pushing on the pole and twisting the pole in the direction the vacuum is to be moved.

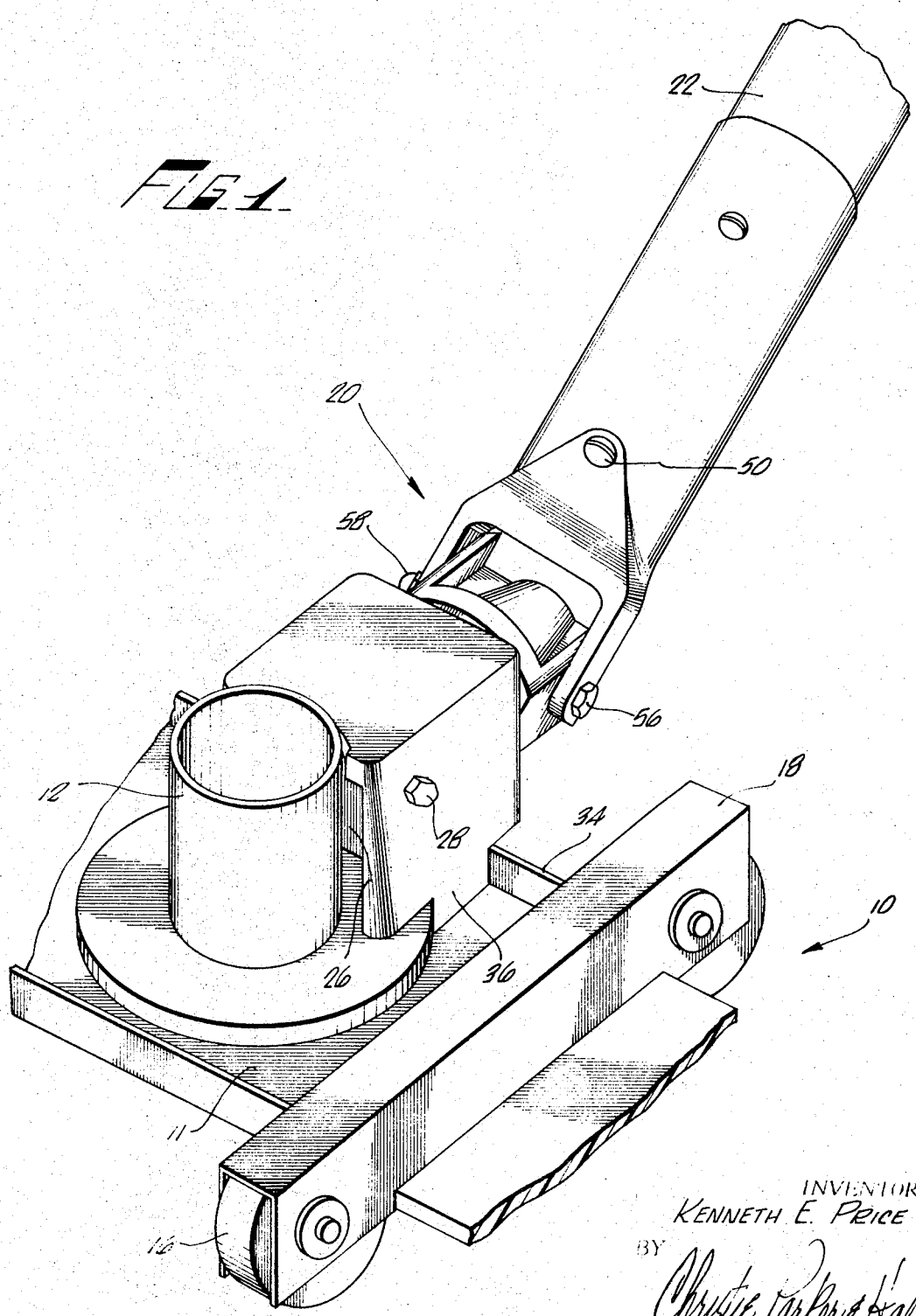


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SHEET 1 OF 3

FIG. 1



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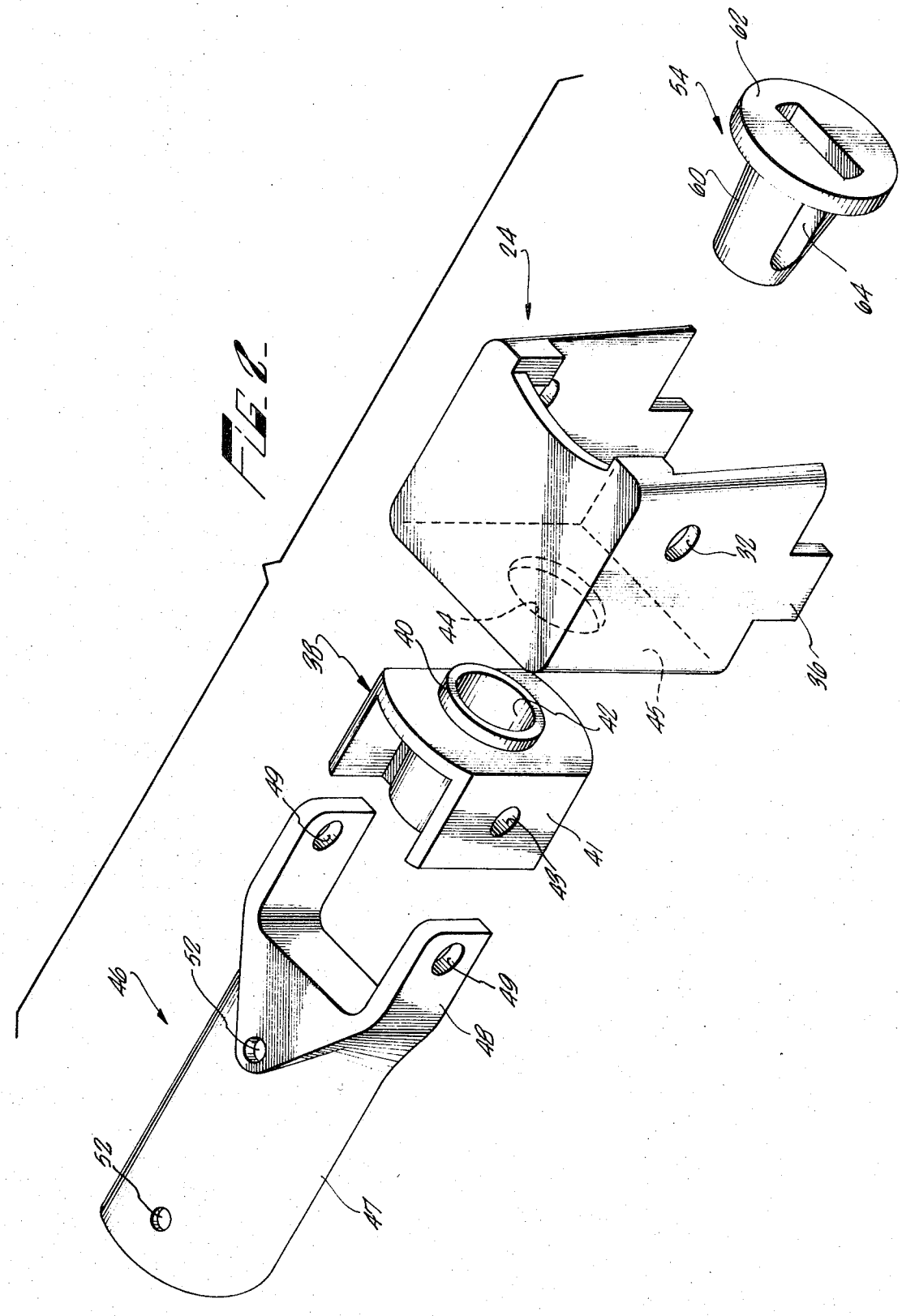


FIG. 2

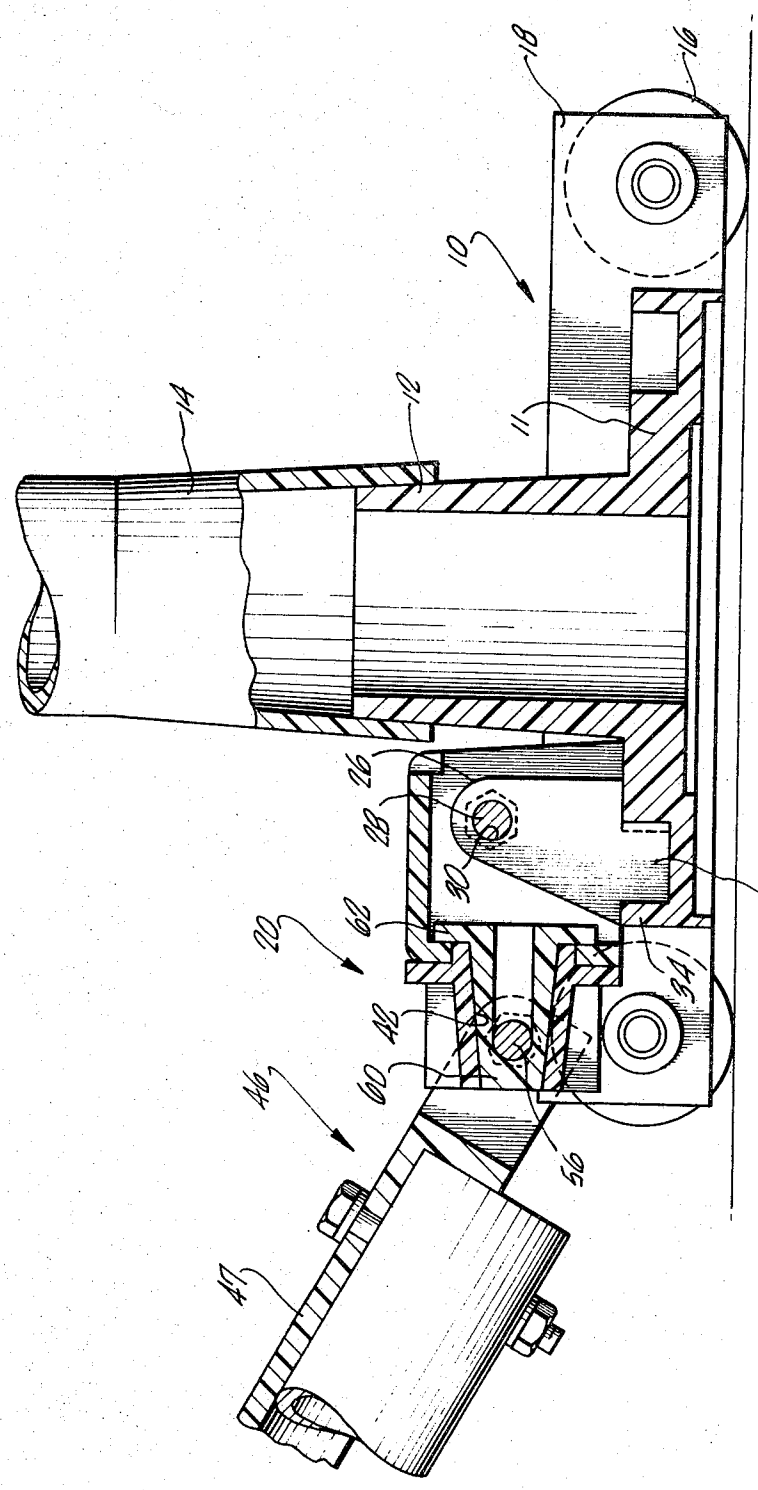


FIG 3

STEERING ATTACHMENT FOR SWIMMING POOL VACUUM HEAD

FIELD OF THE INVENTION

This invention relates to a steering attachment for swimming pool vacuum heads.

BACKGROUND OF THE INVENTION

Vacuum cleaners for removing debris from the bottom of swimming pools generally include a vacuum cleaner head mounted on wheels and connected to a duct extending from the intake of a pool circulation pump. As the head is guided back and forth across the bottom of the swimming pool, the water circulated through the head collects debris from the pool bottom and passes it through a filter before the water is recirculated to the pool. The vacuum head is usually connected to an elongate handle or guide pole by which it is pushed or pulled about over the bottom of the pool. Apparatus currently used to attach a guide pole to a swimming pool vacuum head have certain disadvantages which are overcome by the present invention.

The usual vacuum cleaner head is partly constructed of lead, brass, or other dense, nonbuoyant material. When the head is attached to the end of a long pole and placed on the bottom of a pool, a substantial amount of energy is required to maneuver it about the pool surface. In the past, cleaning problems were compounded because guide poles were connected directly to the vacuum head. The pole was freely swingable about only one axis, and as a result, the head could be moved with relative ease along only one line of travel. Consequently, a workman was not able to stand in one place and steer the head about the pool bottom. To cause the vacuum head to turn on the pool bottom, it was necessary to move the pole laterally, and such lateral movement had to be of considerable extent because of the great length of the pole. As a result, the workman had to walk back and forth along the edge of the pool merely to maneuver the vacuum head as desired on the bottom of the pool. To maintain a proper cleaning sequence, it is desirable for the workman to use his position at the edge of the pool as a gauge or guide to orderly progression of the vacuum head along the pool; lack of orderly progression results in some areas of the pool floor not being swept by the head. Thus, the manner in which prior vacuum heads had to be steered worked against orderly progression of the cleaning sequence and also caused considerable wasted time and effort.

Some of the aforementioned disadvantages have been overcome by connecting the guide pole to the vacuum head by means of a steering mechanism which gives the pole freedom of movement about two axes instead of a single axis. This type of steering attachment allows the pole to the twisted about its longitudinal axis as well as being pivoted about the vacuum head's longitudinal axis. The steering attachment is designed so that forces applied to the head by pushing on the pole can be variably directed eccentric of the head's center of gravity. This allows a workman to stand in substantially one place and steer the vacuum head easily about a large area of the pool floor. This prior steering mechanism, however, is so constructed that it readily comes apart. The mechanism is constructed so that rotation of the pole about its longitudinal axis tends to unscrew a bolt which serves as a connection of the pole to the vacuum head. If the bolt is tightened sufficiently to prevent this unscrewing action, the mechanism becomes undesirably stiff and difficult to manipulate.

SUMMARY OF THE INVENTION

This invention provides a low-friction, noncorroding steering attachment for swimming pool vacuum heads. The attachment is simple, inexpensive, and easy to assemble. The vacuum head is mounted on supporting wheels and has a centrally disposed port which is connected to a duct extending from the intake of a pool circulation pump. The steering attachment is secured to a connecting lug located on the upper surface of the head adjacent the port. Formerly, the operating handle was either pinned directly to the lug or was connected to the lug by the aforementioned prior art steering attachment.

Briefly, the steering attachment of this invention includes a cap mounted over the connecting lug of the vacuum head. A circular aperture is formed through a frontal surface of the cap. The steering attachment additionally includes a swivel member having a body from which extends a sleeve sized to cooperate loosely in the cap aperture. The length of the sleeve is greater than the thickness of the wall of the cap through which the aperture is formed. The swivel is axially bored concentric to the sleeve. Also, the body of the swivel member defines a through hole for a coupling bolt, such hole being perpendicular to and intersecting the bore. The swivel member is secured to the cap by means of a connecting member journaled in the swivel member bore and secured axially of the bore in one direction by a bolt passed through the hole and in an opposite direction by a flange which cooperates with the end of the sleeve and the inner surface of the cap wall. A yoke bracket is secured to the lower end of an elongate operating pole. Th end of the bracket is pivotally secured to the swivel member by means of the same bolt which passes through the swivel member hole to secure the connecting member to the swivel member. Thus, no bolt is used to define the axis about which motion occurs as the operating pole is rotated about its own axis.

The components of this invention are preferably constructed of polymeric resin or other suitable inexpensive plastic material resistive to the chemical additives typically used in swimming pools. Since such resins are lubricated by water, minimal friction is developed between the swivel member and the cap. The result is a substantially friction-free, easily operated steering attachment. Another advantage of this invention is its simplified construction wherein the four structural parts are connected together by only one bolt. This makes the steering attachment easy to assemble and attach to the vacuum cleaner head.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the steering attachment of this invention connected to a vacuum cleaner head, and showing the swiveling capability of the steering attachment;

FIG. 2 is an exploded perspective view of the individual components of the steering attachment; and

FIG. 3 is an elevational sectional view showing the steering attachment connected to the vacuum head.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, a vacuum cleaner head **10** has a horizontal platform **11** defining a centrally disposed upright port **12** for connecting the head to one end of a suction line **14** (FIG. 3). The opposite end of the line is connected in use of the head to the intake of a swimming pool circulation pump so that a vacuum is produced under the head. The head is supported above a pool floor surface by a plurality of rotatable wheels **16** disposed within upwardly projecting, downwardly opening, hollow housings **18**. The wheels preferably are disposed symmetrically about port **12**.

A vacuum head steering attachment **20** connects an elongate operating pole **22** to the head. The steering attachment includes a hollow, rectangular, downwardly and outwardly opening cap **24** which fits over a pair of upright connecting lugs **26** located on the head between the port and an upright flange **34** located along a rear edge of the platform. The cap is secured to the lugs by a bolt **28** which extends through horizontally aligned apertures **30** in the lugs and a pair of cooperating holes **32** disposed on opposite sides of the cap. The line along which apertures **30** are aligned lies parallel to the length of the platform between port **12** and flange **34**. A pair of ears **36** project downwardly from opposite sidewalls of the cap to abut against the upper surface of the platform and the front surface of the flange to interfere with the platform

and flange surfaces and thereby prevent the cap from rotating any significant amount about the axis of bolt **28** during use of the vacuum head.

The steering attachment also includes a swivel member **38** having a solid body defining a circular ringlike stub sleeve **40** projecting outwardly from the body concentric to a tapered bore **42** formed through the body. A bolt hole **43** is formed through the body and is arranged to be perpendicular to and to intersect the axis of bore **42** inwardly of the face of the body from which the stub sleeve projects. The stub sleeve has a length which is slightly greater than the thickness of a rear wall **45** defined by the cap. The opposite ends of bolting hole **43** open to parallel surfaces **41** formed on the opposite sides of the body of the swivel member. When the steering attachment is assembled, stub sleeve **40** is loosely journaled in a circular aperture **44** formed through cap wall **45** for rotation about an axis fixed relative to the cap and the vacuum head and disposed parallel to the platform and perpendicular to the length of the platform.

The steering attachment additionally includes a pole yoke bracket **46** adapted to connect the operating pole to the swivel member. The bracket is comprised of an elongated, transversely arcuately curved tongue **47** terminating in two parallel yoke arms **48** having coaxial holes **49** formed through each arm. The bracket tongue mates with the exterior surfaces of the operating pole and is secured to the lower end of the pole by bolts **50** which extend through a pair of holes **52** in the upper surface of the bracket and through corresponding holes in the pole. The opposing surfaces of arms **48** are spaced apart a distance slightly greater than the distance between swivel member surfaces **41**.

A connecting member **54**, a bolt **56**, and a cap nut **58** cooperate to connect the cap, the swivel member, and the yoke bracket. The connecting member includes a tapered shank **60** which is circular in transverse cross section and is sized to fit loosely within bore **42** of the swivel member. The shank extends from a circular flange **62** which abuts against the end of stub sleeve **40** when the stub sleeve is inserted into cap aperture **44**. A hole **64** is formed through the connecting member shank at such a location along the shank that the hole registers with swivel member bolt hole **43** when flange **62** abuts the end of stub sleeve **40** within the interior of cap **24**; bolt **56** is inserted into aligned apertures **32** and **49** and hole **64** to secure the yoke arms, the cap, swivel member, and connecting member in assembled relation, as shown in FIG. **3**, cap nut **58** being relied upon to secure the bolt in place. The outer diameter of flange **62** is less than the distance radially of aperture **44** to the inner surfaces of the cap side and topwalls with the result that the assembled connecting and swivel members are readily rotatable about the axis of hole **44**. Yoke bracket **46** is also readily rotatable about the shank of bolt **56**. Because the length of stub sleeve **40** is greater than the thickness of cap wall **45**, those surfaces of flange **62** and swivel member **38** which face the opposite surfaces of wall **45** are spaced apart a distance slightly greater than the wall thickness so that the swivel member is readily rotatable relative to the cap about an axis perpendicular to the lengths of bolts **28** and **56**.

Bolt **56** and cap nut **58** are not secured tightly against the arms of bracket **46**. The bolt has sufficient length that when the cap nut is tightened thereon, clearance is provided between the bolt head and the cap nut and the adjacent faces of arms **48**. Accordingly, movement of the bracket about the bolt does not loosen the cap nut, and the pole cannot accidentally separate from the vacuum head.

It will be seen that the structure described above constitutes a universal joint in the connection of pole **22** to platform **11**, that such joint is arranged so that the pivot axis (the axis of bolt **56**) most closely associated with the pole is spaced a substantial distance from the center of platform **11**, and that such axis is in turn rotatable about an axis (the axis of stub sleeve **40**) disposed perpendicular to bolt **56** and to the length of the platform. Accordingly, pole **22** is readily rotatable about its own longitudinal axis. When bolt **56** is parallel to bolt **28**, forces applied axially of the pole by a user of the vacuum head are effective upon the head along a line which is perpendicular to the length of the platform and which passes through the effective center of resistance to movement of the head across the pool surface; the center of resistance to movement of the head is the centroid of the several points of contact with the wheels of the head with the pool surface. When pole **22** is rotated about it length, bolts **28** and **56** are moved out of parallel to each other so that forces applied axially of the pole are effective upon the head along a line which is skew to the length of the platform and which does not pass through such center of resistance, thereby imposing a turning moment upon the vacuum head. The turning moment has a relatively large moment arm in view of the substantial spacing of bolt **56** from the center of the platform. It is seen, therefore, that the vacuum head is readily steerable across the submerged surface of a swimming pool merely by rotating pole **22** about its length and by applying moderate pushing or pulling forces to the pole. It is no longer necessary for a user of the vacuum head to move substantial distances along the edge of the pool to maneuver the head about the bottom of the pool, and a pool cleaning operation may be carried out with greater ease and dispatch.

it will be appreciated that bore **42** and shank **60** need not be of circular cross-sectional configuration since these elements are not required to rotate relative to each other.

I claim:

1. In a swimming pool vacuum head having an elongate platform supported upon rotatable wheels disposed substantially symmetrically about a port through the platform adapting the head for connection to a suction duct and upright connecting lug means on the platform adjacent the port centrally of the length of the platform, an improved steering means for connection between the lug means and an elongate operating pole comprising:

a. a first member having a wall defining a circular aperture therethrough and configured in cooperation with the lug means and the platform for connection to the lug means in such manner that the aperture is disposed substantially centrally of the length of the platform and lies in a plane parallel to the length of the platform;

b. a swivel member journaled in the aperture for rotation about the axis of the aperture and extending from the first member laterally of the length of the platform;

c. a tongue member adapted to be immovably secured to the lower end of the pole;

d. means for securing the swivel member in said journaled relation to the first member; and

e. means for connecting the tongue member to the swivel member for rotation relative to the swivel member about an axis normal to the aperture axis and spaced from the first member.

2. Apparatus according to claim **1** wherein the first member is configured in cooperation with the lug means and the platform adjacent thereto to be substantially immovable relative to the platform upon connection of the first member to the lug means.

3. Apparatus according to claim **2** wherein the first member and the lug means are cooperatively configured for releasable connection of the first member to the lug means.

4. Apparatus according to claim **3** wherein the first member defines a cap arranged for disposition over the lug means.

5. Apparatus according to claim **1** wherein the means for connecting the tongue member to the swivel member comprises a bolt hole through the swivel member along a line normal to the portion thereof arranged for journaled engagement with the aperture and in spaced relation thereto, an apertured arm defined by the tongue member, and a bolt cooperating between the swivel member in said hole and the arm for hingeably connecting the arm to the swivel member.

6. Apparatus according to claim **5** wherein the means for securing the swivel in journaled relation to the first member comprises a stub shaft extending from the swivel member nor-

mal to the bolt hole, the stub shaft having a circular cross-sectional configuration of diameter slightly less than that of the first member aperture and a length slightly greater than the thickness of the wall, a bore formed in the swivel member from the end of the stub shaft transversly of th bolt hole to beyond the bolt hole from the stub shaft, a connecting member having a shank configured to fit within said bore and means projecting laterally of the shank sufficiently that when the shank is disposed in the bore the projecting means extends radially outwardly of the stub shaft, and a hole formed through the shank at such location therealong that said hole is registrable with the swivel member bolt hole when the projecting means is abutted with the end of the stub shaft remote from the bolt hole, the bolt cooperating in the shank hole to secure the shank from movement out of the bore.

7. Attachment steering apparatus for connection between a swimming pool vacuum head including an elongate centrally ported platform supported upon wheels and an elongate operating pole carrying a bifurcated yoke member at one end thereof arranged for bolted connection directly to lug means defined by the head adjacent the port to be hingeably relative to the head about an axis parallel to the platform and aligned with its length, the steering apparatus comprising:

a. a cap sized to fit over the lug means for bolted connection to the lug means along the axis associated with the lug means, the cap defining through a wall thereof a circular aperture which lies in a plane parallel to the axis associated with the lug means when the cap is connected to the lug means;

b. a swivel member having a body sized to fit loosely between the bifurcations of the yoke member and defining:

1. a stub shaft of length slightly greater than the thickness of the cap wall defining the aperture and of circular cross-sectional configuration extending from the body and sized to cooperate loosely within said cap aperture,

2. a first hole into the body from the end of the stub shaft, and

3. a bolt hole through the body normal to the length of the stub shaft in spaced relation to the stub shaft and traversing the first hole; and

c. a connector member for securing the swivel member to the cap with the stub shaft loosely journaled in the cap aperture and defining:

1. a shank sized to fit within the swivel member first hole,

2. a projection extending laterally of the shank at one end thereof a distance sufficient that, when the shank is disposed in the first hole and the stub shaft is disposed in the aperture, the end of the projection lies outwardly of the edge of the aperture from the center thereof, and

3. means along the shank remote from the projection for cooperating with a bolt passed through the bolt hole for hingeably connecting the yoke member to the swivel member to secure the shank from movement out of the first hole, whereby, when the cap and the swivel member and the connector member are assembled as aforesaid, a bolt engaged between the yoke member and the swivel member via the bolt hole both connects the yoke member and the swivel member about a hinge axis normal to the stub shaft axis and secures the swivel member from dissociation from the cap.

8. Steering apparatus according to claim 7 wherein the cap is configured to be secured from significant movement relative to the head upon connection to the lug means.

9. Steering apparatus according to claim 7 wherein the means along the connector member shank comprises a hole through the shank for registry with the bolt hole when the connector member and swivel member are assembled as aforesaid.

10. Attachment steering apparatus for connection between a swimming pool vacuum head including an elongate, wheeled, centrally ported platform and a bifurcated yoke member attachable to one end of an elongate operating pole by a bolt engaged with lug means defined by the head centrally of the length of the platform so that the pole is hingeable relative to the head about an axis aligned with its length, the steering apparatus comprising:

a. a cap sized for disposition over the lug means and arranged to be secured by said bolt to the lug means to be essentially stationary relative to the head and defining through a wall thereof a circular aperture which lies in a plane parallel to the axis associated with the lug means and substantially normal to the platform when the cap is connected to the lug means;

b. a swivel member having a body sized to fit loosely between the bifurcations of the yoke member and defining:

1. a stub shaft extending from the body a distance slightly greater than the thickness of the cap wall and having a circular cross-sectional configuration sized to cooperate loosely within said cap aperture,

2. a recess into the body from the end of the stub shaft, and

3. a bolt hole through the body normal to the length of the stub shaft in spaced relation to the stub shaft and traversing the recess; and

c. a connector member for securing the swivel member to the cap with the stub shaft loosely journaled in the cap aperture and defining:

1. a shank sized to fit within the recess,

2. a projection extending laterally of the shank radially outwardly of the aperture when the shank is disposed in the recess and the stub shaft is disposed in the aperture, and

3. means along the shank remote from the projection for cooperating with a bolt passed through the bolt hole to hingeably connect the yoke member to the swivel member for securing the shank from movement out of the recess.