United States Patent [19]

Shelstad

[11] **3,772,725**

[45] **Nov. 20, 1973**

[54] **CAR WASHING APPARATUS**

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[21] Appl. No.: **263,000**

[52] **U.S. Cl.** ..... **15/21 D, 15/DIG. 2**
[51] **Int. Cl.** **B60s 3/06**
[58] **Field of Search** ..... 15/DIG. 2, 21 D, 15/21 E, 53

[56] **References Cited**

UNITED STATES PATENTS

3,540,069	11/1970	Grant	15/21 D
3,570,034	3/1971	Lanfrankie	15/21 D
3,662,419	5/1972	Dini	15/21 E

FOREIGN PATENTS OR APPLICATIONS

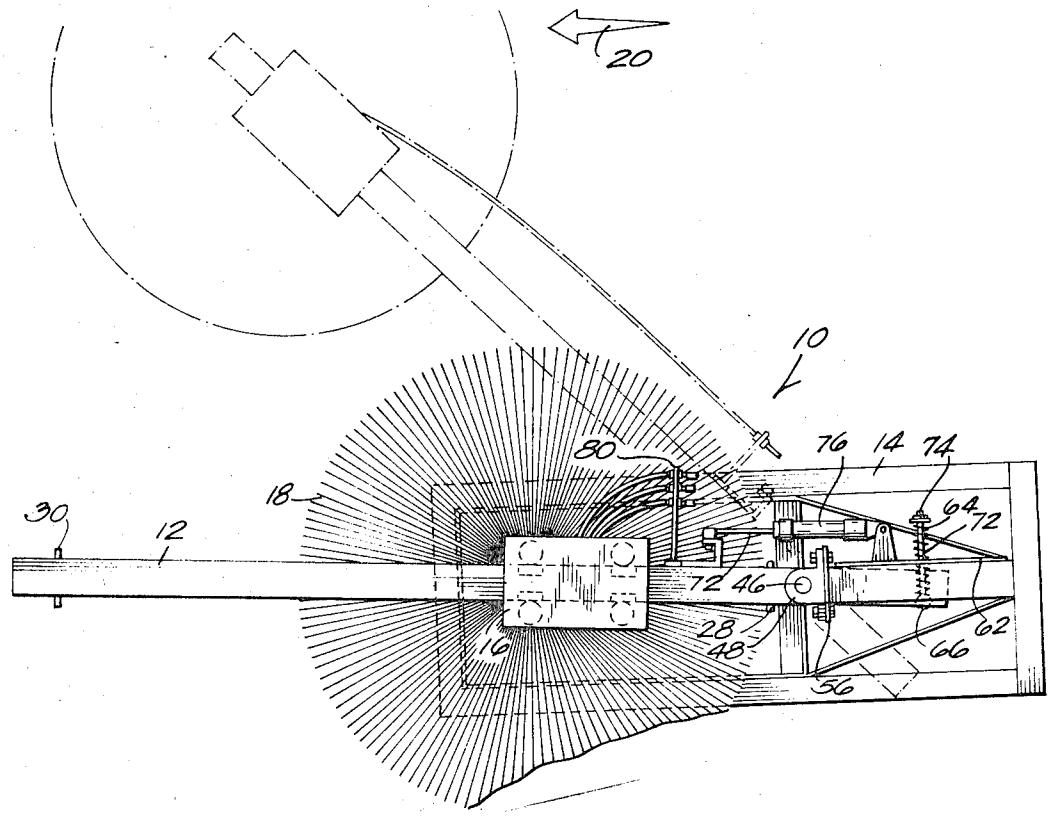
1,951,067	10/1970	Germany	15/DIG. 2

Primary Examiner—Edward L. Roberts
Attorney—John W. Michael et al.

[57] **ABSTRACT**

As a car moves along a predetermined path through a wash bay, it sequentially engages a pair of oppositely rotating brushes centrally disposed in its path. Each brush is suspended from a carriage which is axially movable along an overhead boom. The booms are pivotally mounted at their inner ends on opposite sides of the bay. The boom pivot axis is angularly oriented so that the boom is urged by gravity to the starting position with its outer free end inclined downwardly. Continued forward movement of the car swings the boom forwardly from the starting position to a retracted position to a retracted position beside the car's path. Frictional resistance between the brush and car causes the carriage to move axially towards the inner end of the boom while gravity maintains the brush in traction against the side of the car. As the car moves past the retracted brush, gravity urges the boom towards the starting position and the carriage is moved axially by gravity towards the free end of the boom. A hydraulic damper controls the rate at which the boom swings back towards the starting position to insure proper scrubbing of the rear of the car.

15 Claims, 8 Drawing Figures



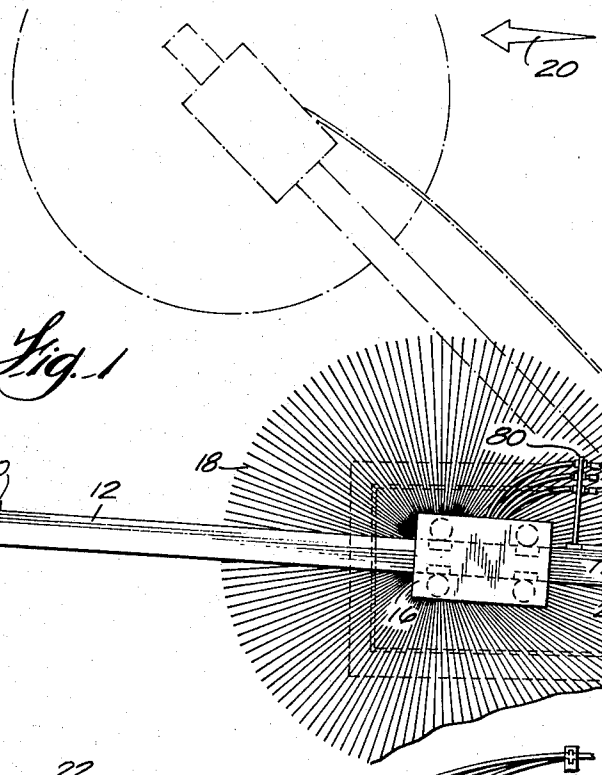

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Fig. 1

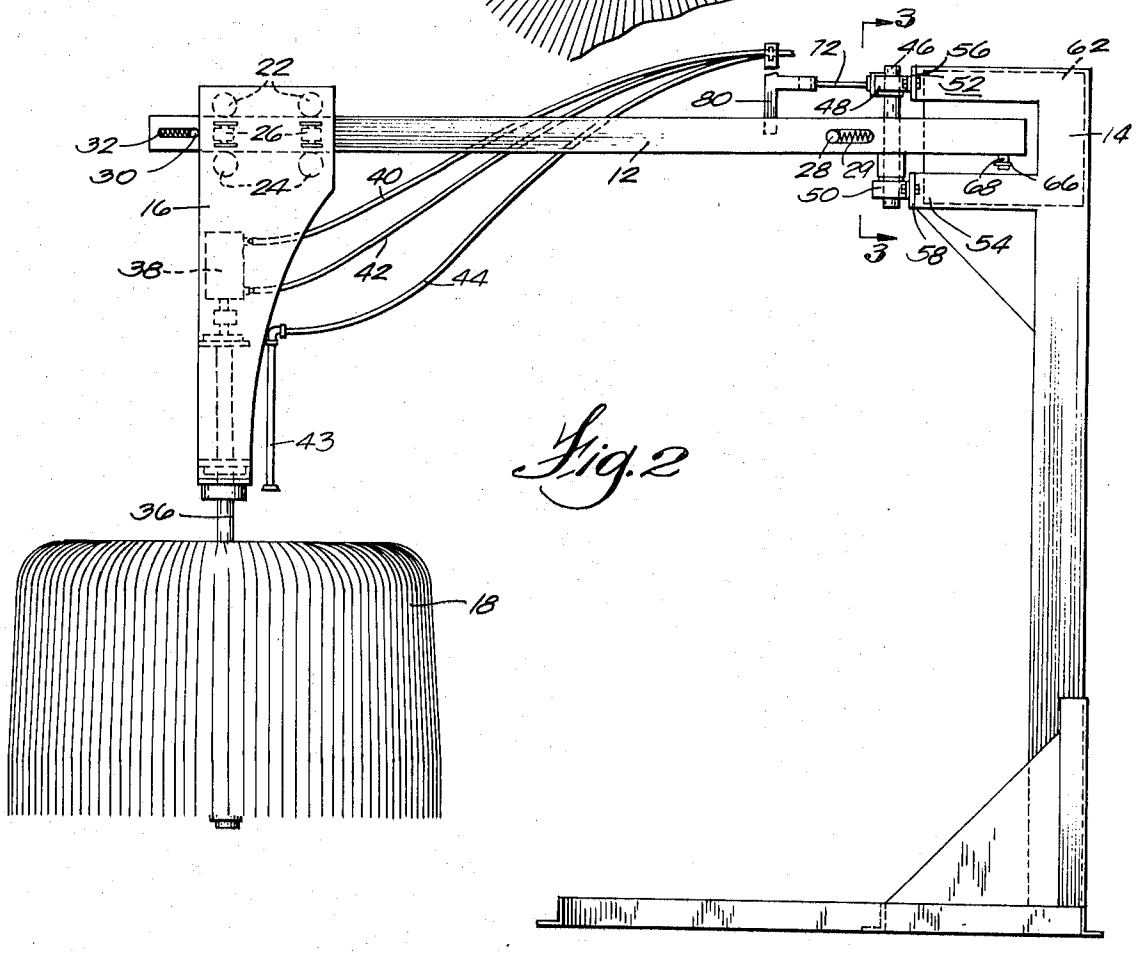
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Fig. 2

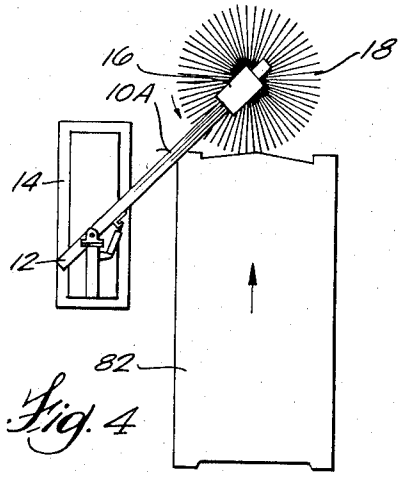

Fig. 4

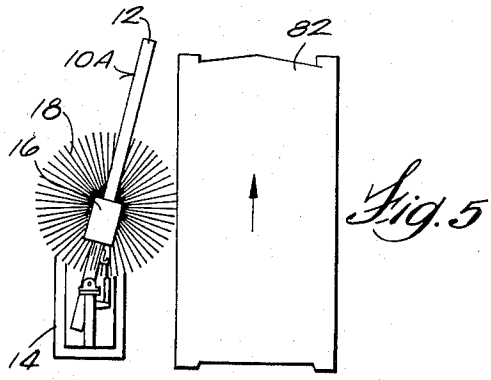

Fig. 5

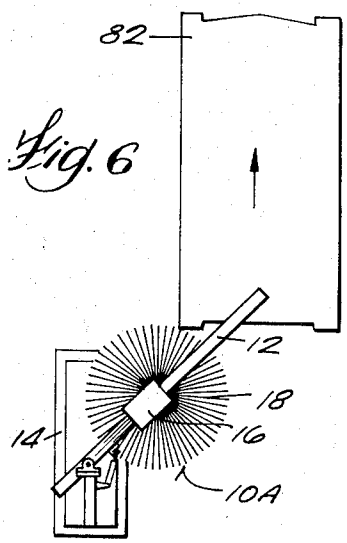

Fig. 6

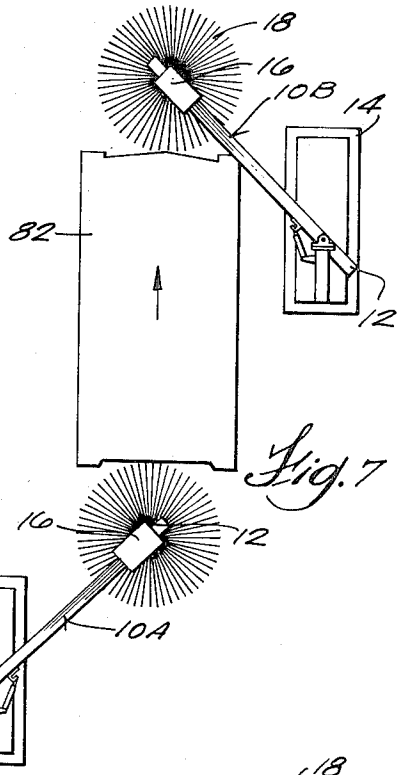

Fig. 7

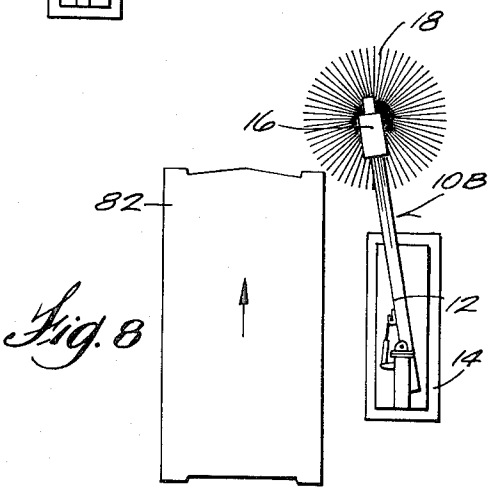

Fig. 8

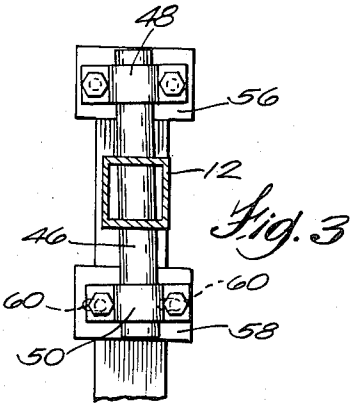

Fig. 3

CAR WASHING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to car washing apparatus and, more particularly, to wrap-around brush assemblies therefor.

Automatic car washing apparatus typically employs a pair of vertical rotary brushes, carried on an overhead arm, which scrub the front, sides and back of the car. The arms are positioned in sequential order on opposite sides of a bay through which the car is driven or moved by a conveyor. As the car passes through the bay, the arms are moved so that each of the brushes first scrub laterally and outwardly from the center of the car, then longitudinally along the side, and finally laterally and inwardly back to the center of the car.

Various means have been employed to provide a controlled movement of the overhead arms. For example, U.S. Pat. No. 3,350,733 describes a relatively elaborate hydraulic system, including various valving and controlling devices, for controlling the movement of the arms. In addition to requiring a large area for installation, and being expensive to fabricate, devices of this type require frequent maintenance and part replacement because of the large number of moving parts. U.S. Pat. No. 3,570,034 describes an arrangement of springs, pulleys and weights for controlling the movement of the arms. Although having fewer moving parts, devices of this type require considerable supporting structure, making installation relatively expensive. U.S. Pat. No. 3,626,537 describes the use of articulated arms which are operated by gravity. Devices of this type are considerably less complex in the other two discussed above; however, several moving components are still required.

SUMMARY OF THE INVENTION

The primary object of this invention is to provide a car washing apparatus having a simplified wrap-around brush assembly which can be controlled with a minimum of moving parts and, thus, has reduced fabrication and maintenance costs.

Another object of this invention is to provide such a brush assembly which requires a relatively small space for installation and operation.

The car washing apparatus of this invention includes an overhead boom pivoted at its inner end about a fixed pivot axis positioned at one side of the car's path. In the starting position, the boom extends transversely of this car's path, preferably at about a 45° angle to the path in the forward direction, and is pivotable from this starting position to a retracted position generally parallel to the car's path. A carriage, from which a vertical rotary brush is suspended, is axially movable along the boom. The boom is inclined downwardly toward its outer free end so that the carriage is biased by gravity towards a neutral position, disposed substantially in the center of the car's path when the boom is in the starting position. The pivot axis for the boom is arranged at a slight angle to the vertical to provide this incline and to provide a gravity bias urging the boom toward the starting position.

As a car moves along its predetermined path, it contacts the brush and swings the free end of the boom toward the retracted position. The frictional resistance between the rotating brush and the car provides the necessary traction to obtain the desired scrubbing action along the front of the car. As the car advances, this frictional resistance causes the carriage to move axially along the boom thereby moving the brush rearwardly along the side of the car. As the rear corner of the car moves past the brush, the boom is urged by gravity to swing toward the starting position, enabling the carriage to be moved by gravity toward the neutral position so that the brush scrubs the rear of the car. Preferably, control means is provided to control the rate at which the boom returns toward the starting position so that a substantially constant force is maintained between the brush and the car. A spring loaded carriage stop menas can be provided on the outer end of the boom which permits the carriage to be released a predetermined distance past the neutral position, in the event the brush engages a larger than normal projection on the front of the car.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of the wrap-around brush assembly of this invention, shown in the normally extended and retracted positions.

FIG. 2 is a side elevational view of the brush assembly of FIG. 1.

FIG. 3 is a fragmentary, detailed view taken along the plane designated 3—3 in FIG. 2.

FIGS. 4–8 are diagrammatic plan views of the brush assemblies illustrating their different positions as a car moves through the wash bay.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The car washing apparatus of this invention includes a pair of oppositely rotating, wrap-around brush assemblies which brush the right and left sides of a car as it moves along the predetermined path through a wash bay. The car is either moved through the bay by a conventional conveyor means or driven through, with the wheels being guided in wheel guides in a conventional manner. The two wrap-around brush assemblies, which are located sequentially on opposite sides of the bay, are arranged in substantially the same manner. Therefore, only the brush assembly located on the left side of the automobile (i.e. the driver's side) is illustrated in detail in FIGS. 1–3.

Referring to FIGS. 1 and 2, each wrap-around brush assembly 10 includes an overhead boom 12 mounted on a vertical standard 14 located at the side of the wash bay. Boom 12 carries carriage 16, which is axially movable along the boom and from which a rotary vertical brush 18 is suspended. As shown in dashed lines in FIG. 1, boom 12 extends transversely of the washing bay at a 45° angle to the path of the car (designated by arrow 20) when in the starting position shown by dashed lines in FIG. 1. Carraige 16 is biased (by gravity as explained below) to neutral position on the outer end of boom 12, disposing brush 18 centrally in path 20.

Carriage 16 has a plurality of rollers 22, 24, 26 which engage and roll along the top, bottom and sides of the boom, respectively. These rollers are arranged to hold the carriage captive against the rocking forces imposed thereon when a car strikes brush 18 as it moves through the washing bay. These rollers are mounted on concentric shafts, which are adjustably mounted on the carriage so that the rollers can be adjusted into and away from engagement with the boom. Thus, the rollers can be adjusted to obtain good rolling engagement with the

boom at the time of initial installation of the carriage and during use as the rollers wear. The inward movement of carriage **16** along boom **12** is limited by spring-loaded stop pin **28** which extends transversely through slots **29** provided in the sides of the boom near the inner end thereof. The outward movement of carriage **16** along boom **12** is limited by a spring-loaded stop pin **30,** which extends transversely through slots **32** provided in the sides of the boom near the outer end thereof.

Brush **18** is mounted on a vertical drive shaft **36,** which is driven by hydraulic motor **38.** Brush **18** is of conventional design having flexible bristles which are flailed outwardly by centrifugal force to impinge on and wipe the car body with a scrubbing action. The brush of the assembly located on the driver's side of the automobile (the one shown in FIGS. **1** and **2**) rotates in a counterclockwise direction, while the brush of the assembly located on the passenger side of the automobile rotates in a clockwise direction. Motor **38** is connected to a source of hydraulic fluid (not shown) by hoses **40** and **42.** If desired, motor **38** can be a conventional electric motor, in which case an electrical cable (connected to a suitable source of electrical power) is used in place of hydraulic hoses **40** and **42.** Detergent is sprayed onto brush **18** by nozzle **43,** the upper end of which is mounted on carriage **16.** Detergent is supplied to nozzle **43** by hose **44.** The outlet head of nozzle is preferably adjustable so that detergent can be sprayed onto the brush, directly onto the car, or both.

Boom **12** has a vertical shaft **46** located near its inner end which acts as its pivot axis. The upper and lower ends of shaft **46** are journaled in self-aligning, anti-friction bearing **48** and **50,** respectively. Bearings **48, 50** are mounted to the outer ends of horizontal arms **52** and **54,** respectively, which are located on the top portion of support standard **14.** Arms **52** and **54** are positioned generally parallel to the longitudinal axis of car path **20.** These arms extend outwardly from vertical standard **14** so that brush **18** will not strike the vertical standard when carriage **16** is moved against stop pin **28.** Upper bearing **48** is bolted to end plate **56** on upper arm **52** and lower bearing **50** is bolted to end plate **58** on lower arm **54.**

As shown in FIG. **3,** lower end plate **50** has elongated slots **60** through which the lower bearing mounting bolts are installed. Slots **60** permit lower bearing **50** to be shifted transversely to the right with respect to the upper bearing **48** (as viewed in FIG. **3**) so that the longitudinal axis of shaft **46** is at a small angle to the vertical (e.g. about **4.5** degrees). With shaft **46** so oriented, the longitudinal axis of boom **12** is substantially horizontal, when it is in a retracted position, generally parallel to path **20** (shown by the solid lines in FIG. **1**). The boom inclines downwardly toward its outer-free end in the starting position. Lower bearing **50** is adjusted to provide boom **12** with a sufficient incline so that carriage **16** is moved by gravity toward the neutral position, as the boom swings from the retracted position towards the starting position. Also, this angular orientation of the boom pivot axis creates a gravity bias urging the boom toward the starting position.

As shown in FIG. **3,** shaft **46** is preferably arranged to extend through the boom at a slight angle to the vertical. When so arranged, the transverse axis of the boom remains substantially parallel with the floor to it swings back and forth. This permits the carriage to roll freely on the boom and provides uniform wearing of the rollers and the boom surface because of the uniform bearing load of the carriage on the boom. Also, the vertical axis of the brush is maintained substantially perpendicular and generally parallel to the side of the car, thereby producing a uniform scrubbing action. If shaft **46** is arranged vertically, the surfaces of the boom are tilted and the carriage is slightly cocked from the vertical. The resultant unbalanced bearing load inhibits carriage movement to some degree and causes non-uniform wearing of the rollers and the surfaces of the boom.

A vertical plate **62** is mounted on the bay side of arms **52** and **54.** Rods **64** extends through an opening in plate **62** and has a rod end bearing **66** at one end which is pivotally mounted on the inner end of boom **12** via pin **68.** Boom **12** is partially biased to the starting position by coil spring **70,** which is guided on one end of rod **64** and bears against one side of plate **62,** and coil spring **72,** which is held on the opposite end of rod **64** by retainer **74** and bears against the otherside of plate **62.**

A conventional hydraulic cylinder motion damper **76,** connected between boom **12** and plate **62,** controls the rate in which the boom swings back to the starting position during the brushing operation. Damper **76** has conventional fluid flow control means which provides substantially unrestricted flow during extension of the piston rod **72** (as the boom swings towards the retracted position) and restricts the fluid flow to control the retraction rate of the piston rod (as the boom is swung back toward the starting position). Outrigger bracket **80,** mounted on and depending outwardly from the side of boom **12,** holds hydraulic hoses **40, 42** and detergent supply hose **44** away from the brush so they do not become entangled therewith as the carriage travels back and forth on the boom during the brushing operation.

As mentioned above, the wrap-around brush assemblies are located on opposite sides of the washing bay and are situated so they are engaged sequentially by a car moving through the bay. As shown in FIGS. **4-8,** the assemblies are positioned so that car **82** first contacts assembly **10A** located on the driver's side. Upon initial contact by car **82,** brush **18,** driven counterclockwise by motor **38,** commences scrubbing the front of the automobile. The brush moves from the center toward the left front corner, as boom **12** is swung toward the retracted position by the forward movement of car **82.** As the left front corner of the car moves past the brush (with the boom in the retracted position), spring-loaded stop pin **30** allows carriage **16** to move further toward the outer end of the boom, in the event the brush encounters a larger-than-normal projection, such as a protruding headlight or the like.

As the boom swings to the retracted position, spring **70** is compressed to accept the thrust and prevents the brush from bouncing, thereby insuring the brush does not miss scrubbing a portion of the front fender. After the left front corner of the car has advanced past the brush, the frictional resistance between the rotating brush and the car tends to move carriage **16** axially along boom **12** toward its inner end as shown in FIG. **5.** Spring-loaded stop **28** limits the inward movement of the carriage with its spring absorbing the thrust of the carriage. The combination of the gravity bias on the boom produced by its non-vertical pivot axis, and the biasing force of spring **70** maintains the brush against

the side of the automobile with sufficient traction to provide the desired scrubbing action as the car advances.

By the time the left rear corner of car 82 advances past the retracted brush, boom 12 has been urged by gravity generally to its starting position as shown in FIG. 6. The rate at which the boom returns toward the starting position is controlled by motion damper 76 so that substantially uniform and constant pressure is maintained between the brush and the car. Carriage 16 is then moved toward its neutral position by the combination of gravity and the frictional resistance between the brush and the car as shown in FIG. 7. Spring 72 prevents the brush from bouncing away from the rear of the car as the carriage travels toward the neutral position. Spring 72 also compresses to allow the brush to go past the center of the automobile. Upon decompression, spring 72 repositions the boom to the starting position so a portion of the rear of the car is rescrubbed.

When car 82 reaches the position shown in FIG. 7, the brush of assembly 10B is engaged. The brush, driven clockwise by motor 38, commences scrubbing the right side of the car in the same manner as described above. In a practice, the relative location of the brush assemblies along the wash bay can be closer together, so that brush assembly 10B is engaged and commences scrubbing the car prior to reaching the position shown in FIG. 7. Assemblies 10A and 10B are preferably arranged so the brushes extend slightly past the center of path 20, when in the starting position. This provides some overlap of scrubbing and insures complete coverage.

From the above description, it can be appreciated that the car washing apparatus of this invention is arranged so that movement of the wrap-around brush is controlled with a minimum of moving parts. The primary motivation of the brush is provided by the traction of the brush itself and by gravity, which maintains the brush in traction against the car body, returns the boom to its starting position, and returns the carriage to its neutral position. Thus, the need for elaborate, expensive and high maintenance controls is not required to attain satisfactory brush operation and assure the brush closely follows the contour of the car. The free standing unit, although sturdy in construction, does not require a structural housing and is economical to fabricate. Furthermore, minimum space is required to accommodate movement of the overhead arm.

As will be readily apparent to those skilled in the art, upon reading the above detailed description of a preferred embodiment of this invention, various modifications and alterations can be made thereto without departing from the spirit and scope thereof.

I claim:

1. Car washing apparatus for scrubbing the front, one side, and rear of a car body as it moves along a predetermined path comprising:

an overhead boom pivoted at its inner end about a fixed axis positioned at one side of said path and having an outer free end, said boom extending transversely of the path and inclining downwardly towards its free end when in a starting position and being pivotable between the starting position and a retracted position generally parallel to the path;

biasing means for biasing said boom toward the starting position;

a carriage axially movable along said boom, said carriage being biased by gravity toward a neutral position near the free end of said boom and disposed substantially centrally in the path;

a rotary vertical brush suspended from said carriage; and

means for rotating said brush in a direction such that, upon being contacted by a car moving along the path, the contact between said rotating brush and the car causes the free end of said boom to swing forwardly toward the retracted position until said brush reaches the front corner of the car, then moves said carriage axially along said boom with said brush moving rearwardly along the side of the car toward the rear corner thereof as said biasing means urges said boom to swing toward the starting position, and after the rear corner of the car moves past said brush, said carriage is moved by gravity axially back along said boom toward the neutral position with said brush moving along the rear of the car.

2. The car washing apparatus according to claim 1 wherein said biasing means includes means for positioning the pivot axis, so the pivot axis is displaced from the perpendicular outwardly from the car at its lower end to provide the downward incline of said boom when said boom is in the starting position, and to provide a gravity bias urging said boom toward the starting position.

3. The car washing apparatus according to claim 2 wherein said boom has a transverse axis and a carriage support surface means thereon, and said carriage has a roller means therein in engagement with said carriage support surface means, said displaced pivot axis of said boom positioned with respect to the transverse axis of said boom so as to provide a uniform bearing load between said roller means and said carriage support surface means to thereby provide uniform wearing of said roller means and said carriage support surface means.

4. The car washing apparatus according to claim 3 wherein said positioning means includes a laterally shiftable journal means carrying the pivot axis.

5. The car washing apparatus according to claim 4 including a support means positioned at one side of the path and carrying said journal means, said journal means mounted on said support means so that the longitudinal axis of said boom is substantially horizontal when in the retracted position.

6. The car washing apparatus according to claim 1 including control means which permits substantially free movement of said boom toward the retracted position and controls the rate at which said boom swings back toward the starting position from the retracted position, so that a substantially constant force is maintained between said brush and the car.

7. The car washing apparatus according to claim 6 wherein said control means includes a fluid cylinder connected to said boom, said cylinder including a piston and a fluid control means which controls fluid flow to one side of said piston so it can move freely in one direction as said boom moves toward the retracted position and limits fluid flow to the other side of said piston so it moves at a controlled rate in the opposite direction as said boom swings back toward the starting position.

8. The car washing apparatus according to claim 1 including a vertical standard positioned at one side of

said path and carrying the pivot axis and wherein said biasing means includes

a vertical plate mounted on said standard;

a rod means slidably extending through an opening in said plate and including a first end pivotally mounted to the inner end portion of said boom and a second end extending through the opening;

a first spring means carried on a first end of said rod means which bears against one side of said plate and is compressed as said boom moves towards the retracted position; and

a second spring carried on a second end of said rod means which bears against the opposite side of said plate and is compressed as said boom swings back past the starting position.

9. The car washing apparatus according to claim **3** wherein said boom is disposed forwardly in the direction of the car movement at an angle of approximately 45° to the path when in the starting position.

10. The car washing apparatus according to claim **1** including

a spring-loaded carriage stop means positioned near the outer end of said boom which is normally engaged by said carriage when in the neutral position for permitting said carriage to move axially along said boom a predetermined distance from the neutral position in the event said brush engages a larger than normal projection on the front of the car.

11. Car washing apparatus for scrubbing the front, one side and rear of a car body as it moves along a predetermined path comprising:

a support means positioned at one side of the path;

an overhead boom pivoted at its inner end about a fixed axis carried by said support means and having a free outer end, said boom extending transversely of the path and inclining downwardly towards its free end when in a starting position and being pivotable between the starting position and a retracted position generally parallel to the path;

means for positioning said pivot axis with its lower end displaced from the perpendicular outwardly from the car to provide the downward incline of said boom and to provide a gravity bias urging said boom toward the starting position;

a carriage axially movable along said boom, said carriage being biased by gravity towards a neutral position near the free end of said boom and disposed substantially centrally in the path;

a rotary vertical brush suspended from said carriage; and

means for rotating said brush in a direction such that, upon being contacted by a car moving along the path, the contact between said rotating brush and the car causes the free end of said boom to swing forwardly towards the retracted position until said brush reaches the front corner of the car, then moves said carriage axially along said boom with said brush moving rearwardly along the side of the car towards the rear corner thereof as said boom is urged by the gravity bias toward the starting position, after the rear corner of the car moves past said brush, said carriage is moved by gravity axially back along said boom toward the neutral position with said brush moving along the rear of the car.

12. The car washing apparatus according to claim **11** wherein said boom has a transverse axis and a carriage support surface means thereon, and said carriage has roller means thereon in engagement with said carriage support surface means, said displaced pivot axis of said boom positioned with respect to the transverse axis of said boom so as to provide a uniform bearing load between said roller means and said carriage support surface means to thereby provide uniform wearing of said roller means and said carriage support surface means.

13. The car washing apparatus according to claim **12** including

a spring-loaded carriage stop means positioned near the outer end of said boom which is normally engaged by said carriage when in the neutral position and permits said carriage to move outwardly along said boom a predetermined distance from the neutral position in the event said brush engages a larger than normal projection on the front of the car.

14. The car washing apparatus according to claim **11** wherein said boom is disposed forwardly in the direction of the car movement at an angle of approximately 45° to the path when in the starting position.

15. The car washing apparatus according to claim **14** including control means which permits substantially free movement of said boom towards the retracted position and controls the rate at which said boom swings back towards the starting position from the retracted position so that a substantially constant force is maintained between said brush and the car.

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