

[54] **WATER REMOVING DEVICE**

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[58] Field of Search..... **15/50 C, 50 R, 98, 320-322, 15/353, 352, 340, 302; 29/132; 100/121; 180/20**

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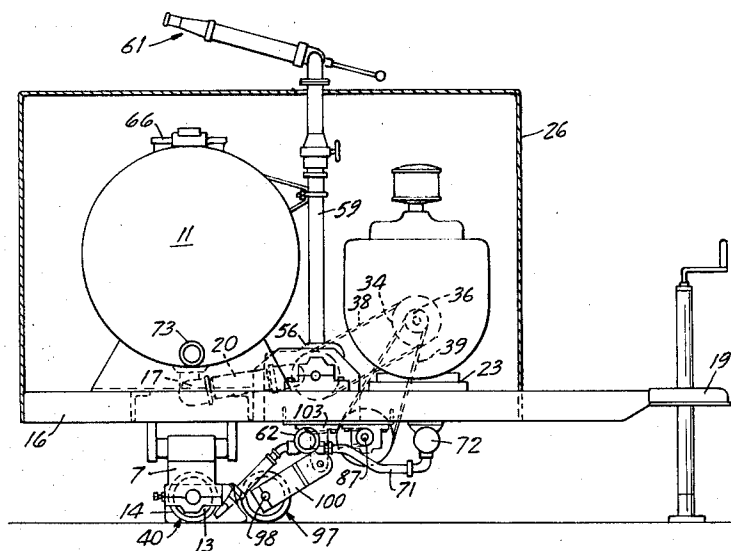
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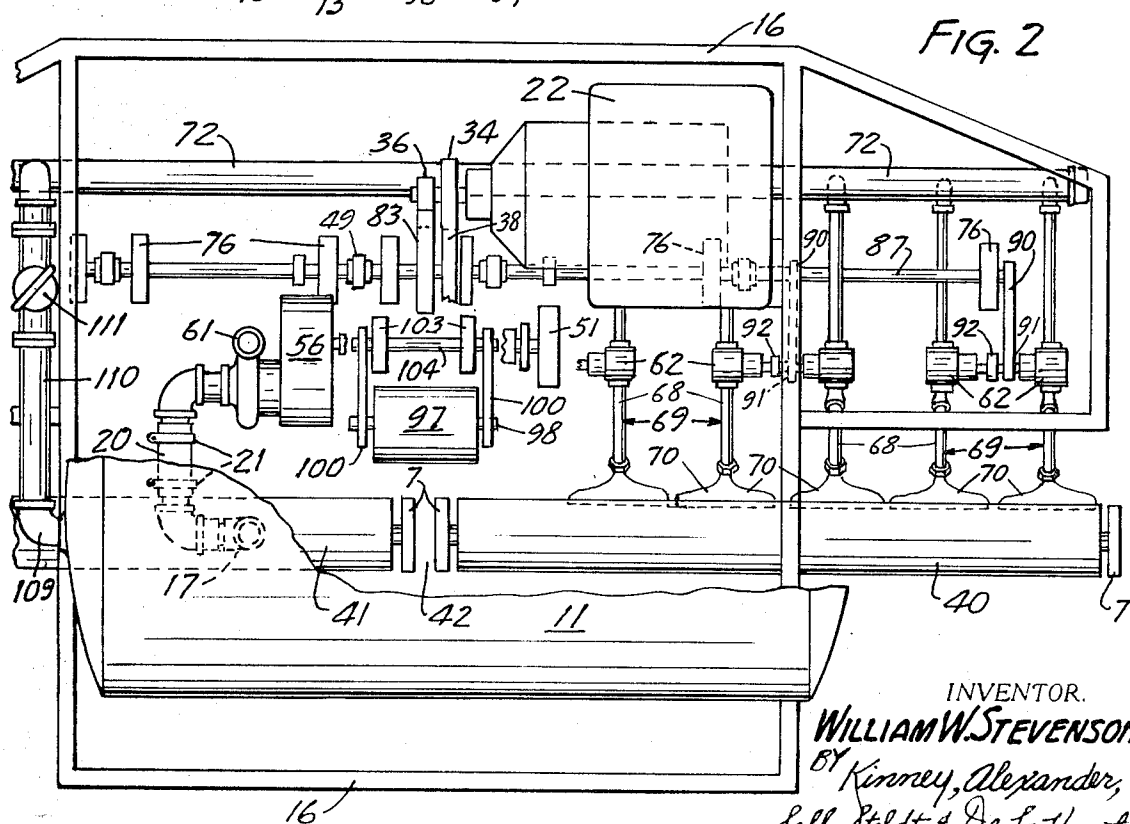
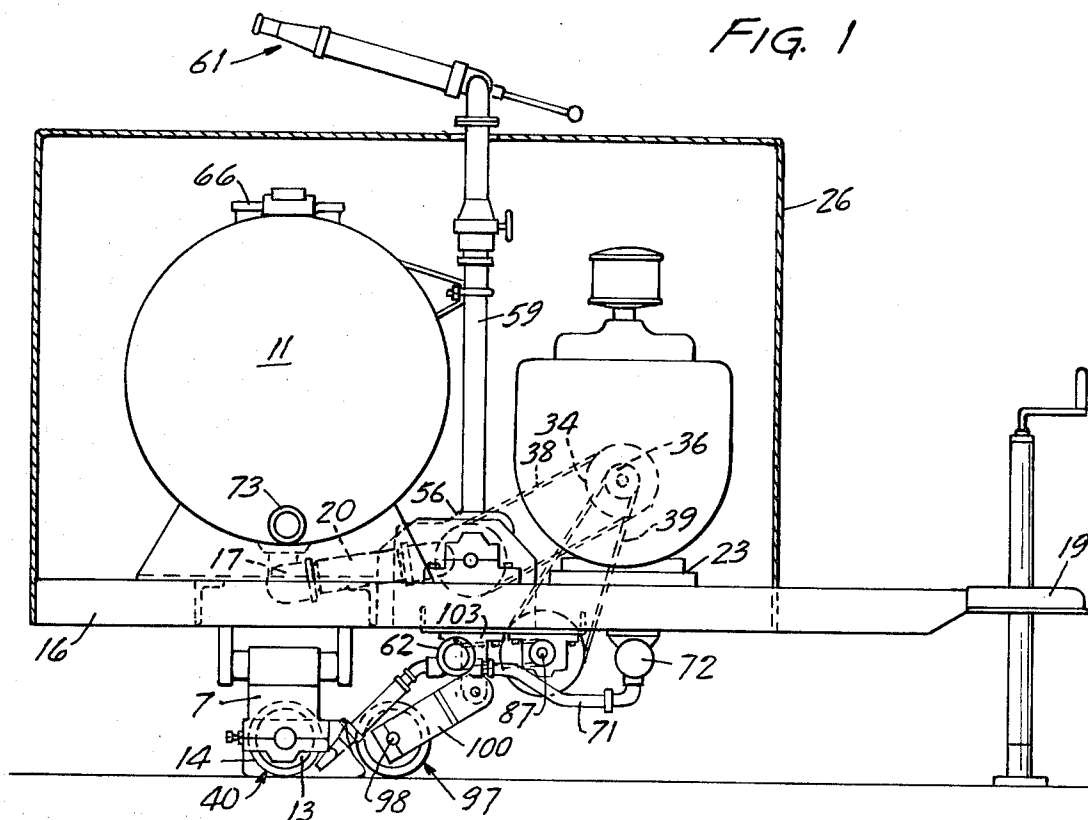
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ABSTRACT

A device for removing water from an artificially surfaced field comprises, in combination, a frame; at least one roller rotatably mounted in said frame and extending at least partially therebelow, said roller having a diameter of from about 2 to 20 inches and adapted to roll over said surfacing, there being sufficient weight exerted on said roller by the weight of the roller, the weight of the device, or preferably a combination thereof, so that said roller exerts at least 10 pounds per square inch pressure on said surface along the length dimension of said roller, said roller pressing said surface to express water therefrom to a position in front of said roller; suction means to remove said water from in front of said roller; and means on said frame to hold the water after it is removed.

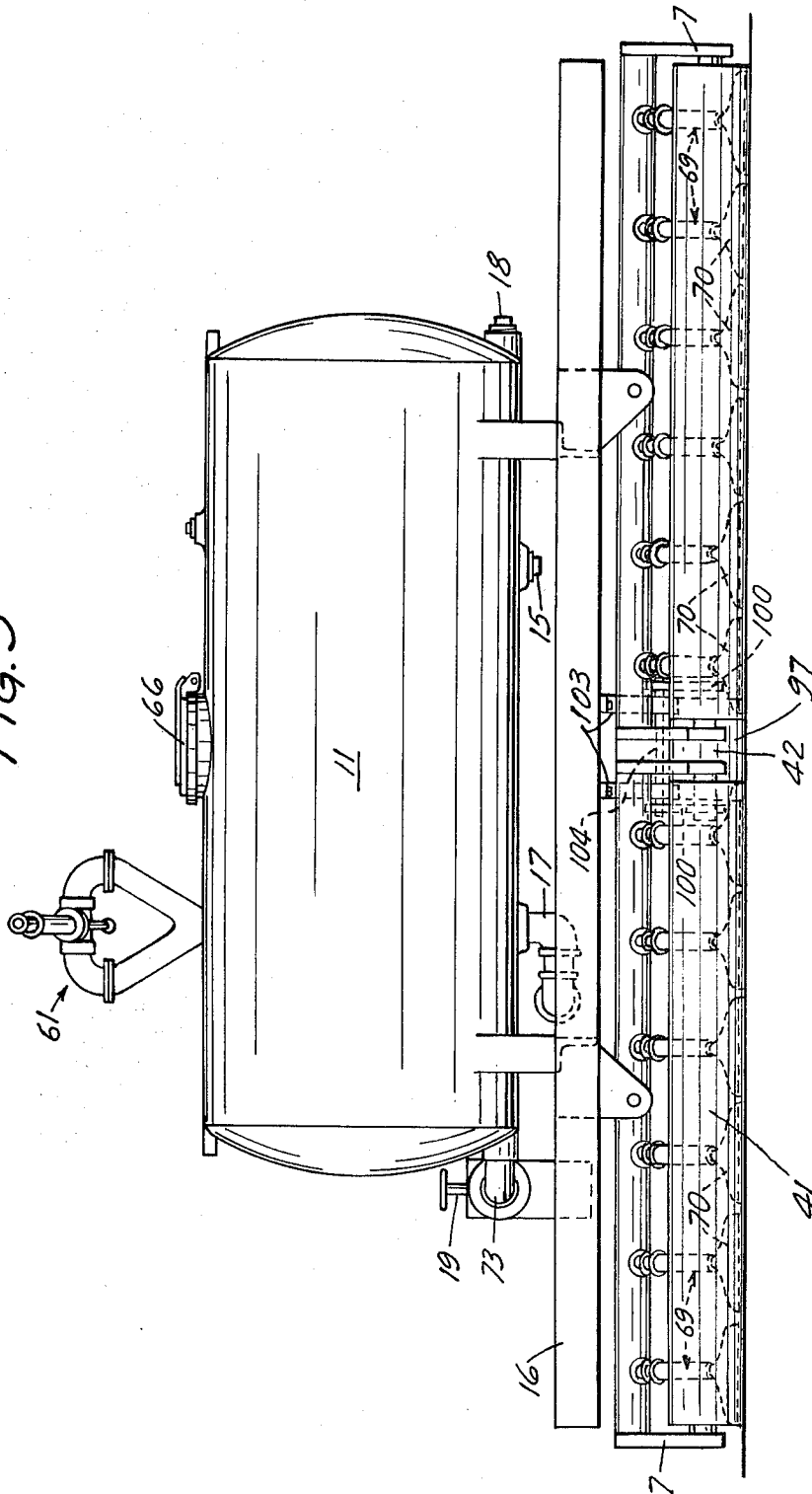
7 Claims, 3 Drawing Figures





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FIG. 3



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WATER REMOVING DEVICE

BACKGROUND OF THE INVENTION

The present invention relates to a device for removing water from an artificially surfaced field. More particularly, the present invention contemplates a device for removing water from an artificially surfaced field by means of a roller exerting pressure against the field to express water from the field to a position in front of the roller, in combination with suction means to remove the water that is so expressed. The device of the present invention allows the artificially surfaced field to be in a playable condition immediately after a rain or the like so that events scheduled for the field do not have to be canceled or postponed.

At present, artificially surfaced fields are used quite extensively in both professional and amateur stadiums as such turf has several advantages over natural turf. A synthetic turf is durable, is easily maintained, and minimizes the chances of injury to users of the field. Nevertheless, an accumulation of water on the synthetically surfaced field may occur after a heavy rain. The substrate used with artificial turf is impermeable and the field either must be sloped to allow water to drain off the field or accumulated water on the surface simply allowed to evaporate, which may take a much longer period of time than it does with natural turf.

Drainage systems have been employed on some artificially surfaced fields which are essentially trenches or "manholes" located proximate to or in the field itself. Although certain of these drainage systems allow the field to drain so that water will not remain on the field for an extended period of time, they are inadequate for the immediate removal of water after a heavy rain. Thus, there is a need for a device that will remove water from a synthetically surfaced field when there is insufficient time to allow the field to drain naturally.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a device for conveniently removing water from an artificially surfaced field, such that the field may be placed in a playable or usable condition, immediately after a rain or the like. The device may be self-propelled or, more conveniently, pulled behind a truck, tractor or other powered vehicle over the field so that the entire field may be freed of water in a very short time, e.g., less than one hour for 45,000 sq. ft.

The device essentially comprises, in combination, a frame; at least one roller rotatably mounted in said frame and extending at least partially therebelow, said roller having a diameter of from about 2 to 20 inches and adapted to roll over said surfacing, there being sufficient weight available from the weight of the roller, the weight of the frame, or preferably a combination thereof, so that said roller exerts at least 10 pounds per square inch pressure on said surface along the length dimension of said roller, said roller pressing said surface to express water therefrom to a position in front of said roller; suction means in front of said roller to remove said water and; means to hold said water after it is removed.

In the preferred embodiment, said suction means comprise a plurality of suction nozzles flexibly mounted to said frame and situated immediately in

front of said rollers and only slightly above the field. When the device is pulled along the field, the rollers express water from the field to a position immediately forward the moving rollers such that the nozzles, having reduced pressure therein, draw up the water in front of the rollers transferring the water to the holding means on the frame. The water may then be carried by the device or removed therefrom by a spraying system in the device or by other means.

The objects and advantages of the present invention will be better understood with reference to the following drawings wherein:

FIG. 1 is an elevated side view of the device of the present invention with the housing in section;

FIG. 2 is a partial top view of the lower half of the device; and

FIG. 3 is an elevational rear view of the device.

With reference to the drawings, particularly FIG. 1, the device of the present invention comprises a frame 16 which may or may not have a cover or housing 26 mounted thereon for protection of the moving parts of the device and for aesthetic purposes. A rubber covered roll 40 is rotatably mounted to the frame 16 by means of a bracket 7 pivotably mounted on and suspended below said frame. In one embodiment of the invention, the roll consists of a steel core 13 having a soft rubber cover 14 thereon. Immediately in front of roll 40 is mounted a suction attachment 69 comprising a hose 68 having a fan-shaped nozzle or wand 70 attached thereto. The suction pickup hose 68 is attached to the frame via a suction pump 62, so that the wand 70 is adjacent the surface contacted by the roller and just in front of the surface contacting portion of the roller. The pump 62 serves to reduce the air pressure in the suction attachment 69 so that water may be drawn thereinto and later transferred to a holding tank 11. The pump 62 is in turn attached to a manifold 72 by means of a hose 71. Additionally, attached to frame 16 near pump 62, is a center roll 97. This roll is attached to the frame 16 by means of a roll bracket 100 attached with a pivot bracket 103. A central pump 56 is provided to force water from the device to a point off the field and is driven by an engine 22 by means of a timing belt 38. The engine 22 is mounted on the frame by means of an engine mount 23.

The holding tank 11, for receiving the water removed from the field, is mounted on frame 16. The tank 11 has an aperture 73 to which is attached a pipe 110 leading to the manifold 72 for the intake of water and a manhole 66 to allow entry into the tank for cleaning purposes and the like. The tank is connected to a pump 56 by means of a pipe or tubing 17, such pump and tubing being used for the removal of water from the tank after collection. Attached to pump 56 is a pipe 59 having a nozzle 61 attached thereto which allows water to be removed from the tank and sprayed to a point off the field. The device has a hitch 19 which may be conveniently engaged with a corresponding part on a tractor or car.

As illustrated in FIG. 3, the pickup wands are preferably used in series, six of the wands riding in front of roller 40 and six riding in front of a second roller 41 such that a fan-shaped suction nozzle is placed in front of each foot of width of roll surface. The wands are preferably spaced as described so that the pickup of

water in front of both rolls is essentially uniform along the entire width of the device. There is a space 42 between the two rollers which allows the rollers to pivot independently of each other compensating for possible deviations in the surface of the field over which the device may be pulled. Water, however, does not pass through space 42 as a center roll 97, presses the water out of the artificial turf and directs it in front of the two main rollers 41 and 40 where it may be removed. Rolls 40 and 41 are preferably about 6 feet long and have a diameter of from about 2 to 20 inches. It was found that the stated diameter of the roll provides the most optimum pressing effect against the synthetically surfaced field for the removal of water. The wands themselves are preferably about 11 inches wide although this width may vary depending on the number of wands used and the size of the rollers used.

The illustration in FIG. 2 best illustrates how the device of the present invention operates. Each suction attachment 69 along the length of the rolls 40 and 41 are individually attached to a pump 62, one pump used for each wand, which in turn is attached to a central drive shaft 87 by means of a timing belt 90 and pulley 91. The drive shaft is connected to an engine 22 by a timing belt pulley 83. Thus, each suction nozzle has an individual pump so that it may work independently of the rest to insure water removal at all times, and also to decrease the burden on one pump if it were used alone. Further, if only one pump were used, all of the nozzles would stop working when one of the nozzles started pulling air instead of water. The suction attachment 69 is attached to the manifold 72, the manifold running the entire width of the machine and attached to each suction nozzle. At one side of the device, the manifold 72 is attached to a pipe 110 having a valve 111 therein, said pipe attached to tank 11 at 72 by means of an elbow joint 109. A hose 20 is attached to the bottom portion of the tank by a second elbow joint 17 which in turn is attached to the spraying nozzle 61 by pipe 59. The spraying nozzle is attached to a pump 56 which is also driven by engine 22. The pump 56 is connected by a clutch (not shown) to the main engine drive by means of pulley 34.

When the device is to be used, the hitch 19 may be conveniently engaged with a truck or tractor which will pull the device over the playing field. As the device is pulled over the field, the weight exerted on the rollers forces the rollers to press against the artificial turf, thereby expressing water therefrom in front of the roller as the rollers move along. The wand pickup 70, which is flexibly attached to the device by means of a non-rigid, corrugated hose 68, actually rides on the water that is expressed in front of the roller as the device moves, placing it in the most desirable position to draw up the water. Reduced air pressure created in the pickup wand due to the pump 62 causes the water to be sucked up into the pickup wand 70 by reduced air pressure created by the pumps and transferred to manifold 72. The water then travels through the manifold to the connecting pipe 110 and into the tank 11. The tank has at least a 400 gallon capacity and thus, large portions of the field may be cleared of water before the machine has to be emptied. Consequently, the device of the present invention has the advantage that the water does not have to be rehandled.

It is important that there be sufficient pressure placed on the roller so that the water can be expressed from the artificial turf. This pressure may be provided, in part, by the roller itself which preferably has a steel core having a layer of neoprene rubber vulcanized on the core. Further pressure is obtained through the weight of the device itself and, in addition, through the weight of the water as it is collected in the tank. The pressure exerted against the turf should be at least 10 pounds per square inch along the length dimension of the roller and not more than about 80 pounds per square inch. Excess pressure may cause damage to the synthetic fibers. Further, it has been found that pressure over that stated is of no additional benefit with regard to expressing water out of the turf.

After the tank is filled, the engine may be shafted so that pump 56 is activated. Upon such activation, the water in the tank is removed through aperture 20 and is forced out pipe 59 and nozzle 61. Thus, the water on the field may be conveniently removed by means of the device of the present invention and sprayed or otherwise transferred from the device to some point off the field where it will not interfere with the playability of the field. The device can also continuously expell water even while picking up water and, thus, save much time in the water removal process.

Although a plurality of suction nozzles is preferably used, one or two nozzles may also be used. More than one nozzle is preferably used to increase the efficiency of the device in that if one suction wand has insufficient water to pick up, that wand will pump air without affecting the water intake of the other suction wands. The roller or rollers preferably have an outer surface of resilient rubber so that small deviations in the field do not allow spaces to be formed between the roller and the field allowing some water to escape. The roll may be entirely made of such a flexible rubber or may only be surfaced with the resilient rubber as described herein. The rubber surfacing is preferably about ½ to 1 inch thick. Each roller alone, when a steel core is used, weighs about 500 pounds. The weight of the entire device is about 8,000 pounds so that about 4,000 pounds pressure is placed on each roller which is evenly distributed over the length dimension of the roller.

Although the device is designed primarily to be towed by a tractor or truck, the device may also be driven by its own power unit. The speed the device is moved at is determined by the water level in the storage tank and also by the completeness of the water removal. It has found the moving of the device at about 5 miles per hour was suitable for most applications. A gauge may be attached to the device to determine, based on water removal efficiency, how fast the device should be moved.

What is claimed is:

1. A device for removing water from an artificially surfaced field, comprising in combination:
 - a frame;
 - at least one roller rotatably mounted on said frame and extending at least partially therebelow, said roller having a diameter of from 2 to 20 inches and adapted to roll over said field surfacing, therebeing sufficient weight available from the weight of said roller, the weight of said frame, or a combination

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thereof, so that said roller exerts at least 10 pounds per square inch pressure on said field along the entire length dimension of said roller, said roller pressing said surface to express water therefrom to a position in front of said roller;

a plurality of nozzles, each flexibly mounted on the frame independently of each other and independent of said roller mounting, each nozzle being singularly connected to one of a corresponding plurality of suction pumps to draw water into said nozzle and remove said water from in front of said roller; and

means to hold said water after it has been removed.

2. The device of claim 1 additionally having means to transfer said water from said holding means to a point off said field.

3. The device of claim 1 wherein said roller is a metal shaft surfaced with a resilient material.

4. The device of claim 3 wherein said resilient material is rubber.

5. The device for removing water from an artificially surfaced field, comprising in combination;
a frame;

a pair of rollers rotatably mounted on said frame and extending at least partially therebelow, each of said rollers being about 6 feet long and having a diameter of from about 2 to 20 inches, therebeing sufficient weight available from the weight of said

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roller, the weight of said frame or a combination thereof so that said rollers exert at least 10 pounds per square inch pressure on said artificially surfaced field along the length dimension of said rollers;

a plurality of nozzles, each flexibly mounted on the frame independently of each other and independent of said roller mounting, each nozzle being singularly connected to one of a corresponding plurality of suction pumps said nozzles mounted in said frame immediately in front of said rollers and adjacent said field;

a tank mounted on said frame to hold water; and means to move said device on said field;

whereby when said device is moved on said field, said rollers express water from said field to a position immediately forward the moving rollers such that said nozzles, having reduced pressure therein, pick up said water in front of said moving rollers transferring same to said tank.

6. The device of claim 5 wherein said rollers comprise a central steel core surfaced with a soft, neoprene rubber.

7. The device of claim 5 additionally having a small lead roller in front and between said rollers for expressing water to a point in front of said rollers when said device is moved.

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