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Keating

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[54] **EMERGENCY PUMP SYSTEM POWERED BY LAWNMOWER**

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[51] **Int. Cl.** **F04b 17/00**

[58] **Field of Search** 417/231, 236, 229; 15/412; 56/16.8, 16.9; 239/DIG. 6; 415/121

[56] **References Cited**

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[57] **ABSTRACT**

A high-volume pump system for emergency use (flooded basements, etc.) powered by a rotary lawnmower; the pump system comprises a base for supporting a lawnmower and a high-volume rotary pump mounted in the base below the lawnmower. A coupling adapter is included in the system and is fastened to the lawnmower blade; the coupling adapter connects the lawnmower to the pump to afford a short, direct driving connection for operating the pump.

7 Claims, 6 Drawing Figures

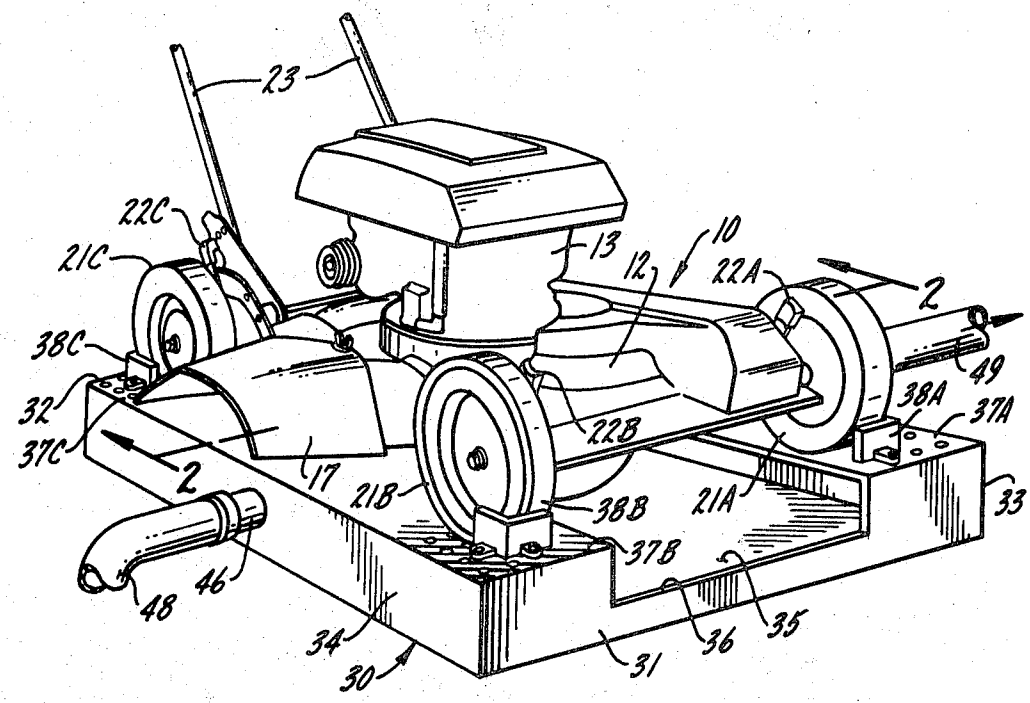


fig.1.

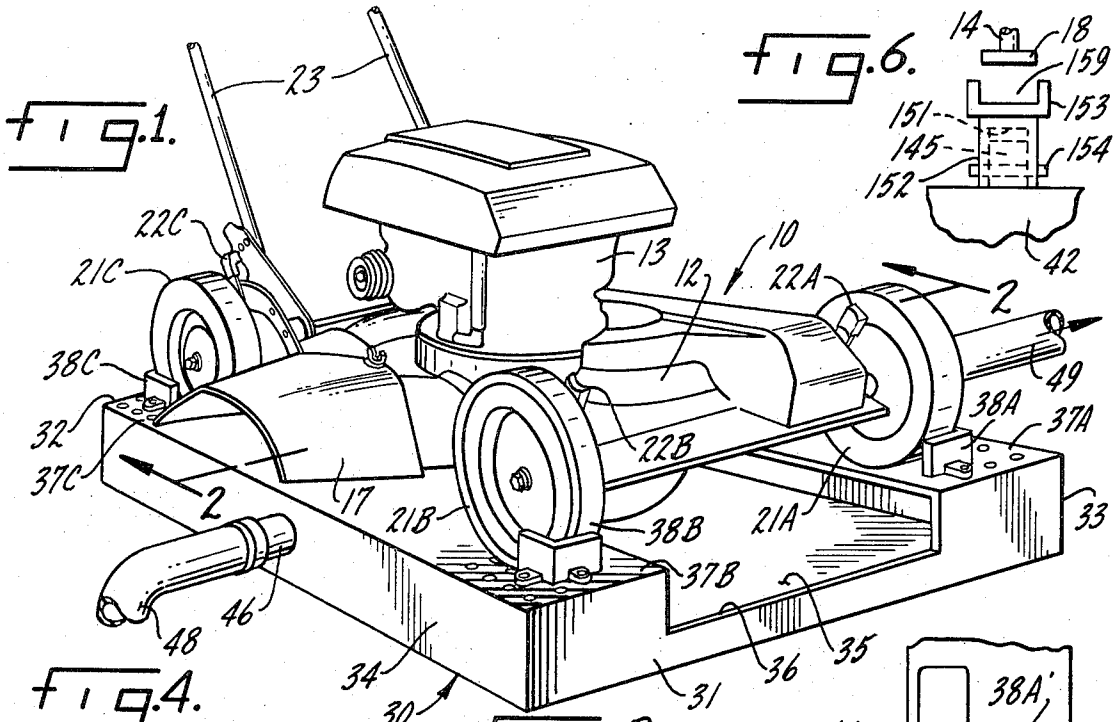


fig.2.

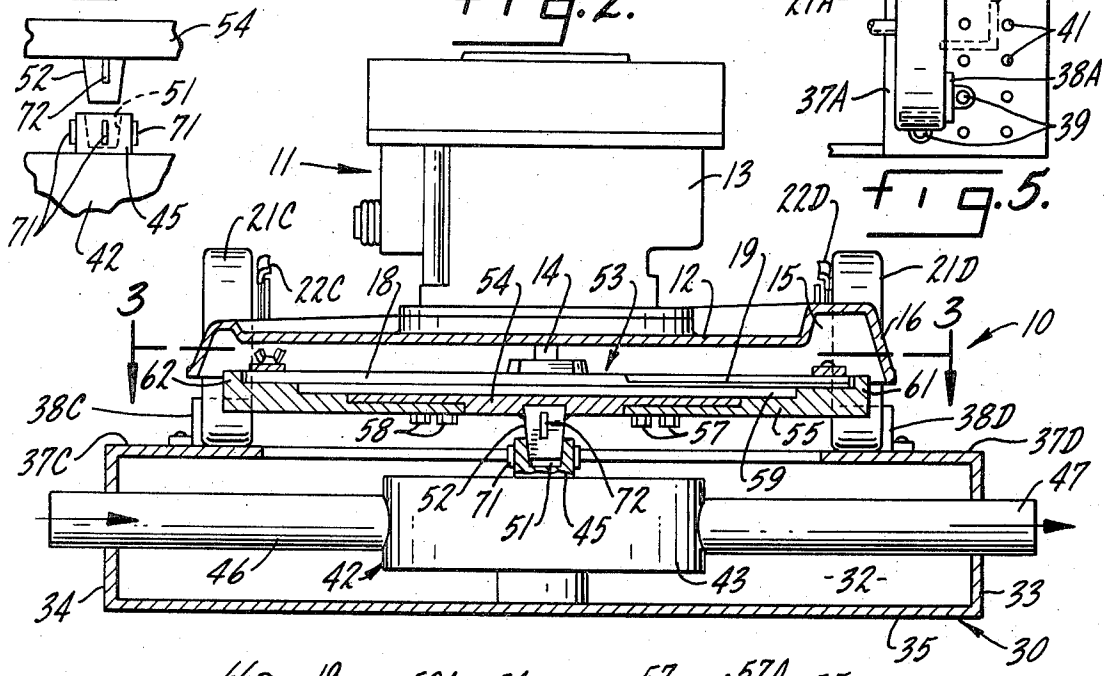


fig.3.

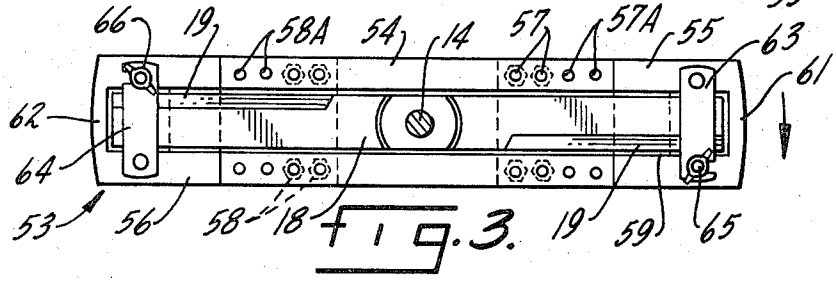


fig.4.

fig.5.

fig.6.

EMERGENCY PUMP SYSTEM POWERED BY LAWNMOWER

BACKGROUND OF THE INVENTION

With continuing development and expansion of urban and semi-urban areas, particularly in the suburbs surrounding major metropolitan areas, flood control presents an increasingly difficult problem. The interference with natural drainage occasioned by expanding real estate development, for both housing and commercial purposes, creates increasingly extensive areas in which the runoff of ground water requires an excessive time. The consequence is more frequent flooding of basements, repeatedly producing serious damage.

The expedients available to a homeowner, or to the owner of a commercial building, where flooding is a continuing problem, include the provision of an electric pump to pump out the building basement when required. This presents only a partial solution to the difficulty, however, since heavy rain conditions are frequently accompanied by powerline failures, particularly in residential developments where the power lines and associated equipment are often in exposed positions. Another readily available means for alleviating this basement-flood problem comprises a drainage pump driven by a small gasoline engine. This kind of pumping equipment, however, if left unused for substantial periods of time, may present an appreciable difficulty with respect to starting the gasoline engine. The problem could be alleviated by periodic test operation of the engine, but this procedure is likely to be overlooked by the building owner, so that the engine-driven pump may not function properly when its use is required.

For most suburban homes, and for many small commercial buildings, a power-driven lawnmower is readily available and is maintained continuously in operating condition, particularly in those months of the year in which excessive rain conditions are most likely to occur. Conventional power driven lawnmowers usually have gasoline engines in a power range (2 to 5 horsepower) adequate to drive a water pump having a relatively high volumetric capacity. Since the building owner ordinarily maintains his power lawnmower in effective operating condition, with an adequate supply of fuel available, the lawnmower affords a reasonably reliable power source that can be adapted to emergency pumping operations.

Previous proposals have been advanced for the use of a rotary power lawnmower as a power source for auxiliary equipment. Attachments of this kind, as previously proposed, however, are not particularly suitable for the pumping duty required for emergency flood conditions.

SUMMARY OF THE INVENTION

It is a principal object of the present invention, therefore, to provide a new and improved emergency pumping system, powered by a conventional rotary lawnmower, that affords an effective and efficient pumping apparatus for pumping out a basement or other depressed area under emergency flood conditions.

Another object of the invention is to provide a new and improved high-volume pump system powered by a rotary lawnmower that can be placed in operation in a very limited period of time and hence is suitable for emergency flood pumping duty.

Another object of the invention is to provide a new and improved high-volume emergency pumping system that can be effectively adapted to utilization of a variety of different sizes and types of rotary engine-driven lawnmowers, as a power source, without requiring a different mechanical construction to adapt the system to each individual lawnmower type and size.

A specific object of the invention is to provide a new and improved high-volume pump system, powered by a conventional engine-driven rotary lawnmower, that is simple and inexpensive in construction and that is economical to maintain.

Accordingly, the invention relates to a high-volume pump system for emergency use, powered by a rotary lawnmower of the kind comprising a frame supported on a plurality of wheels, an engine mounted on the frame and having a vertically oriented output shaft, and a horizontally extending rotary cutting blade mounted below and connected to the engine shaft. The pump system comprises a base, including a plurality of wheel support members for supporting the wheels of a lawnmower, and blocking means for positioning and retaining the lawnmower in stationary position on the base, supported by the base, with each wheel on one of the wheel support members. A high-volume rotary pump, having a drive shaft, is mounted within the base immediately below the lawnmower, with the pump shaft aligned coaxially with the engine shaft. The system includes an input conduit and an output conduit, each connected to the pump and each extending to the outside of the base. A drive adapter means is releasably connectable to the lawnmower blade and is connected to the pump shaft, completing a direct driving connection from the lawnmower engine to the rotary pump. Indicator means are provided, on the pump shaft and on the drive adapter means, indicating the relative alignment thereof.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a high-volume pump system for emergency use, constructed in accordance with the present invention, with a conventional engine-driven rotary lawnmower incorporated in the system as its power source;

FIG. 2 is a sectional elevation view taken approximately along line 2—2 in FIG. 1;

FIG. 3 is a detail view, illustrating the adapter connection to the lawnmower blade, taken approximately as indicated by line 3—3 in FIG. 2;

FIG. 4 is a detail illustration showing a part of the drive connection for the pumping system of FIGS. 1–3;

FIG. 5 is a detail view of a part of the system, illustrating the blocking means used to position the lawnmower wheels; and

FIG. 6 is a detail view illustrating a different form of drive connection that may be incorporated in the system.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1 and 2 illustrate a high-volume pump system 10, intended for emergency application under flood conditions, that is powered by a conventional engine-driven rotary lawnmower 11. Lawnmower 11 includes

a frame 12 upon which a gasoline engine 13 is mounted. The output shaft 14 of engine 13 is vertically oriented and projects downwardly through the lawnmower frame 12, as shown in FIG. 2.

The frame 12 of lawnmower 11 has an edge configuration that forms a spiral grass-expulsion passage 15 closed on the outer side by a depending skirt 16. The skirt 16 is generally circular in configuration, except for a side discharge opening 17 (FIG. 1). An elongated, horizontally-extending rotary cutting blade 18 is mounted upon the end of the engine shaft 14 that projects below the lawnmower frame 12. In the illustrated construction, the lawnmower blade 18 has two cutting edges 19, as shown in FIG. 3.

Lawnmower 11 includes four support wheels 21A, 21B, 21C and 21D (FIGS. 1 and 2). Each of the lawnmower wheels 21A–21D is provided with an adjusting device for adjusting the height of the lawnmower frame 12 relative to the wheel axis. These height adjustment devices are generally indicated by the adjustment levers 22A through 22D, associated with wheels 21A through 21D, respectively. Lawnmower 11 is provided with the usual handle 23, which serves to guide the lawnmower in its normal operations and that may be employed to enable the operator to push or pull the lawnmower over a lawn. Lawnmower 11 may be of the kind that requires the operator to provide the motive power to move the lawnmower across a lawn; alternatively, lawnmower 11 may be of the type that affords a driving connection to the rear wheels 21C and 21D to allow for self-propelled operation.

Lawnmower 11, as noted above, is quite conventional in construction. Furthermore, the operation of lawnmowers of this general kind is a matter of common knowledge, and hence requires no description here.

Pumping system 10 includes a base 30 of box-like construction, including a front wall 31, a rear wall 32, two side walls 33 and 34, and a bottom 35 (FIGS. 1 and 2). The front wall 31 of base 30 is cut away to afford an access opening 36 (FIG. 1). Base 30 includes four integral wheel support members 37A, 37B, 37C and 37D for supporting the lawnmower wheels 21A, 21B, 21C and 21D, respectively. An adjustable blocking member is mounted on each of the wheel support members 37A–37D. Thus, an L-shaped wheel blocking member 38A mounted upon the wheel support member 37A, is shown in FIGS. 1 and 5. The wheel blocking member 38A is secured to the wheel support member 37A by two bolts 39, one on each side of the blocking member, with the bolts extending downwardly through openings 41 in the support member 37A. As shown in FIG. 5, there are a number of the openings 41 in support member 37A, in a spaced pattern, permitting adjustment of the blocking member 38A to any one of a plurality of positions on the wheel support member 37A. One of the alternate positions for blocking member 38 is illustrated by the dash outline 38A'. Similar blocking members 38B, 38C, and 38D are mounted, in the same manner, on wheel supports 37B, 37C and 37D, respectively.

A high-volume rotary pump 42 is mounted within the base 30 for pumping system 10, as best shown in FIG. 2. Pump 42 includes a main pump housing 43 supported upon a shaft bearing pedestal 44 that is in turn mounted upon the bottom 35 of base 30. The pump shaft 45 projects upwardly from the center of pump housing 43 and is aligned coaxially with the lawnmower engine shaft 14, as described more fully hereinafter. An inlet conduit 46 is connected to the main pump housing 43 and extends outwardly through one side wall 34 of base 30 (FIGS. 1 and 2). A pump outlet conduit 47 is connected to the housing 43 of pump 42 and extends outwardly of base 30 through the side wall 33. The two conduits 46 and 47 are provided with suitable couplings for connection to input and output hoses, as indicated by the hoses 48 and 49 in FIG. 1.

Pump 42 may comprise any rotary pump having a pumping capacity of the order of 50 gallons per minute or more when operated at the rotational speeds common to conventional rotary lawnmowers. Thus, a conventional centrifugal pump may be employed as the pump 42 in system 10. For a centrifugal pump, requiring an axial connection to the inlet conduit, the pump housing 42 is preferably constructed with internal passages connecting the inlet conduits 46 to the center of the pump. Another pump type that may be utilized is a rotary roller pump, of the kind used for agricultural and industrial pumping applications. Pumps of the latter type may be constructed to afford both inlet and outlet connections around the periphery of the pump, as shown in Cook U.S. Pat. No. 3,096,569.

The pump shaft 45 is provided with an upwardly opening tapered socket 51. Socket 51 may be of square, hexagonal, or other appropriate configuration that will afford an effective power-transmitting connection to a short adapter shaft 52 of complementary downwardly tapered configuration. Shaft 52 is a part of a drive connection adapter 53, which includes a center plate 54 to which shaft 52 is fixedly mounted. Adapter 53 further comprises a first extension plate 55 that is fitted to and extends outwardly from one end of the center plate 54, being secured to the center plate by suitable fastening means such as the bolts 57 (FIGS. 2 and 3). At the opposite end of the center plate 54, a second extension plate 56 is mounted on the center plate and is secured thereto by appropriate means such as the bolts 58.

The drive connection adapter 53, as best shown in FIGS. 2 and 3, includes an elongated central aperture or receptacle 59 that extends longitudinally of the adapter assembly, through both the center plate 54 and the extension plates 55 and 56. The overall length of the receptacle 59 can be increased by releasing the bolts 57 and 58, moving the extension plates 55 and 56 outwardly, by equal amounts, and re-fastening the extension plates to the center plate 54 by locating the bolts 57 and 58 in alternate locations as indicated by the apertures 57A and 58A in FIG. 3. In this manner, the length of the receptacle 59 in the driving connection adapter 53 can be adjusted to fit a mower blade of virtually any standard length. It may be noted that the blade length, in conventional mowers, is usually within a limited range of approximately seventeen inches to twenty-four inches. The ends of the receptacle 59 are closed by two end walls 61 and 62, formed integrally with the extension plates 55 and 56, respectively. The end walls 61 and 62 should be thin enough to afford reasonable clearance with respect to the lawnmower skirt 16, as shown in FIG. 2.

The drive connection adapter 53 includes releasable retaining means for securing the adapter to the lawnmower blade 18. In the illustrated construction, this retaining means comprises a latch member 63, pivotally mounted upon one side of extension plate 55, near the

outer end of the extension plate, that is engageable with a wing nut fastener **65** mounted on the other side of extension plate **55.** A similar latch member **64** is pivotally mounted on the other extension plate **56,** near its outer end, and is engageable with a wing nut fastener **66** mounted upon the extension plate.

To facilitate quick mounting of the lawnmower **11** on the base **30** of pumping system **10,** and to enable the user to complete an effective driving connection from the lawnmower to the pump **42,** the pump shaft **45** is preferably provided with a plurality of external indicators **71** that afford an indication of the orientation of the drive socket **51** in the pump shaft **45.** The adapter connector shaft **52** is provided with at least one related external indicator **72.** The arrangement of the indicators **71** and **72** is best shown in FIGS. **2** and **4.** By looking through the access opening **36** in the pumping system base **30** (FIG. **1**), the user can determine when the adapter **53** is aligned with the pump shaft **45,** both angularly and laterally, so that the adapter shaft **52** will fit properly into the pump shaft socket **51.** The access opening **36** also allows the user to correct any misalignment as shown by the indicators **71** and **72.**

To place the high-volume pumping system **10** in operation, the user mounts the adapter **53** on the lawnmower blade **18,** as shown in FIGS. **2** and **3.** The latch members **63** and **64** are each pivoted to the latching position shown in FIG. **3** and are secured in those positions by the wing nut fasteners **65** and **66,** securely clamping the drive connection adapter **53** on the lawnmower blade **18.** The first time the system is to be used, it may be necessary to adjust the overall length of the blade receptacle **59,** by extension or retraction of the adapter extension plates **55** and **56,** using the fastening means **57** and **58** as described above. Once this adjustment is effected, however, it is good for any further use of the same lawnmower in connection with pumping system **10.**

With adapter **53** mounted on the lawnmower blade **18,** lawnmower **11** is placed on the pumping system base **30,** approximately in the position shown in FIGS. **1** and **2.** The first time the system is to be used, the wheel block members **38A–38D** may require adjustment to positions at which each will be closely associated with one of the lawnmower wheels **21A–21D.** As in the case of the adjustment of the length of adapter **53,** the positioning of the wheel block members **38A–38D** is carried out only one time, and thereafter remains constant for any use with the same lawnmower.

Before lawnmower **11** is mounted on the pump system base **30,** the wheel height adjusting mechanisms represented by the adjustment levers **22A–22D** are each adjusted so that the lawnmower frame **12** is elevated to the maximum extent possible with respect to the lawnmower wheels. As a consequence, when the lawnmower is properly positioned on the pumping system base, with shaft **14** centered over shaft **45,** there is some limited clearance between the lower end of the adapter shaft **52** (the adapter **53** is now mounted on the lawnmower) and the upper surface of the pump shaft **45.** Accordingly, if the adapter **53** is not properly aligned with the pump shaft **45,** a misalignment that will be clear from inspection of the indicators **71** and **72,** the user can reach into the pump base through the access opening **36,** and turn the lawnmower blade or the pump shaft slightly to achieve a close approximation of the desired alignment. The adjustment devices **22A–22D** are then actuated to lower the lawnmower frame to the maximum extent possible, seating the adapter shaft **52** in the socket **51** in the pump shaft **45** as shown in FIG. **2.** The pumping system **10** is now ready for operation and pumping can be initiated by starting up the lawnmower engine **13.**

If the owner of the pumping system **10** purchases a new lawnmower, it is not necessary to replace the pumping system. The blocking means for maintaining lawnmower **11** in operative position on base **30,** comprising the blocking members **38A–38D,** can be adjusted to conform to a lawnmower of different size or one having different wheel positions. Similarly, the drive connection adapter **53** can be adjusted to fit the blade in the new mower. Accordingly, as long as a mower of generally similar type is employed, the pumping system **10** can be readily adapted to the new mower, despite a change in size or wheel alignment.

In the course of pumping operation, there is little likelihood that vibration will disengage the driving connection in between the lawnmower **11** and the pumping system. Thus, the drive connection adapter **53** is securely mounted on the lawnmower blade and will not vibrate loose. For almost any commercial mower, the vertical range afforded by the wheel height adjustment is sufficient so that the adapter shaft **52** projects at least a couple of inches into the socket in the pump shaft **45,** virtually eliminating any likelihood that the lawnmower **11** can bounce out of driving engagement with the pump **42.** Of course, if a self-propelled mower is employed, the clutch for the drive to the mower wheels should be maintained disengaged. Even if the clutch is momentarily engaged, however, there is little likelihood of damage to the mower or to the pumping equipment.

FIG. **6** illustrates another connection arrangement that may be employed in the emergency pumping system **10,** entailing a modification in the construction for the pump shaft and the drive adapter that connects to that shaft. As shown in FIG. **6,** the pump **42** may be equipped with a short upwardly extending shaft **145.** The adapter **153** used in this construction includes a downwardly extending adapter shaft **152** having an internal socket **151** for receiving the pump shaft **145.** A firm driving connection is established, from the pump adapter shaft **152** to the pump shaft **145,** by suitable means such as a connection pin **154.** The adapter **153** is similar in construction to the previously described adapter **53** except that the blade-receiving receptacle **159** in the adapter **153** is open-ended so that the receptacle is externally visible, serving the same general purpose as the indicia **71,72.** As before, the lawnmower blade **18** fits into the receptacle **159** to provide the necessary driving connection from the lawnmower to the pump in the system.

The construction shown in FIG. **6** has the advantage, as compared to the previously described construction, that the adapter may be permanently mounted on the pump of the system and does not require the completion of an interconnection to the pump **42,** each time the system is placed in use, as in the first-described embodiment. However, the arrangement of FIG. **6** also presents some disadvantages as compared with the previously described system. Thus, with the construction of FIG. **6** it is rather difficult to align the lawnmower blade **18** with the adapter receptacle **159** unless the

pump shaft is accurately aligned in a direction to afford full visibility through the access aperture **36** before the lawnmower is mounted upon the base **30.** In addition, it may be quite difficult to secure any fastening device that may be provided for the blade **18,** such as the retainer devices **63** and **64** (FIG. 3) after the lawnmower has been lowered into position of use on the pumping system. Thus, the preferred construction is that shown in FIGS. **1–5.**

The pumping system of the invention affords a convenient and inexpensive means for pumping out basements and for other similar emergency applications requiring substantially immediate availability of the pumping apparatus even though electrical power may not be available. The pumping system eliminates any necessity for a separate engine to power the system and affords increased reliability because the lawnmower **11** is more likely to be ready for immediate use than a stand-by engine employed only for pumping service.

I claim:

1. A high volume pump system for emergency use, powered by a rotary lawnmower of the like comprising a frame supported on a plurality of wheels, an engine mounted on the frame and having a vertically oriented engine shaft, and a horizontally extending rotary cutting blade mounted below and connected to the engine shaft, said pump system comprising:

a base, including a plurality of wheel support members for supporting the wheels of a lawnmower and an access opening;

adjustably positioned blocking means for positioning and retaining the lawnmower in stationary position on the base, supported by the base, with each wheel on one of the wheel support members;

a high-volume rotary pump, having a drive shaft, mounted within the base immediately below the lawnmower, with the pump shaft aligned coaxially with and extending upwardly toward the engine shaft;

an input conduit and an output conduit, each connected to the pump and each extending to the outside of said base;

drive adapter means, releasably connectable to the lawnmower blade and releasably connectable to the pump shaft for completing a direct driving connection from the lawnmower engine to the rotary pump;

an indicator means, on the pump shaft and the drive adapter means, indicating the relative alignment thereof and viewable through the access opening in said base.

2. A lawnmower-powered high-volume emergency pump system, according to claim **1,** in which said drive adapter means includes a downwardly tapered adapter shaft which fits into a complementary tapered drive socket in the upper end of said pump drive shaft.

3. A lawnmower-powered high-volume emergency pump system, according to claim **1,** in which said drive adapter means comprises a central adapter plate, a pair of extension plates each adjustably mounted on one end of said central adapter plate to accommodate mower blades of varying lengths, and a mower blade receptacle extending longitudinally of said central adapter plate and both said extension plates.

4. A lawnmower-powered high-volume emergency pump system, according to claim **3,** in which said adapter means further comprises a pair of releasable retainers, each mounted on one of said extension plates, for latching the mower blade into said receptacle.

5. A lawnmower-powered high-volume emergency pump system, according to claim **3,** in which said blocking means comprises a plurality of individual blocking members, one for each wheel support member, each blocking member being mountable at any one of a plurality of different positions on its wheel support member to conform the pump system to lawnmowers of varying size and wheel configuration.

6. A lawnmower-powered high-volume emergency pump system, according to claim **1,** in which the access opening allows view of the drive adapter and the pump shaft to determine when the drive adapter and pump shaft are aligned both angularly and laterally.

7. A lawnmower-powered high-volume emergency pump system, according to claim **1,** in which the pump shaft is provided with a plurality of external indicators and the drive adapter means is provided with at least one external indicator.

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