June 23, 1936. E. W. HIMBERGER 2,044,849

PORTABLE PUMPING UNIT

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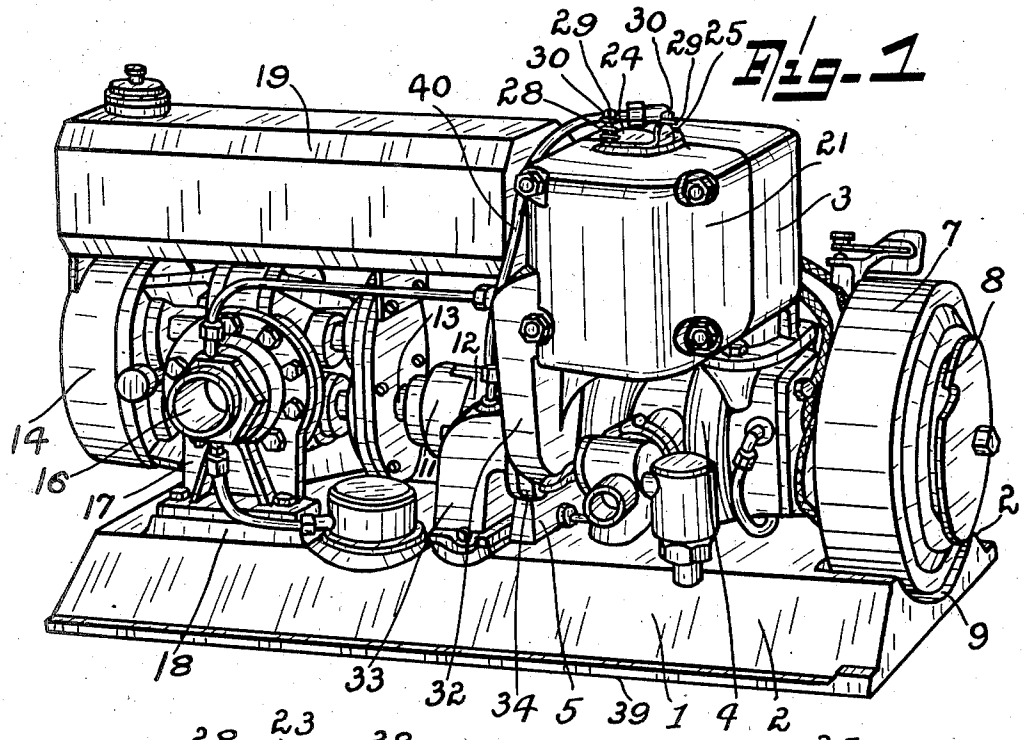


Fig. 1

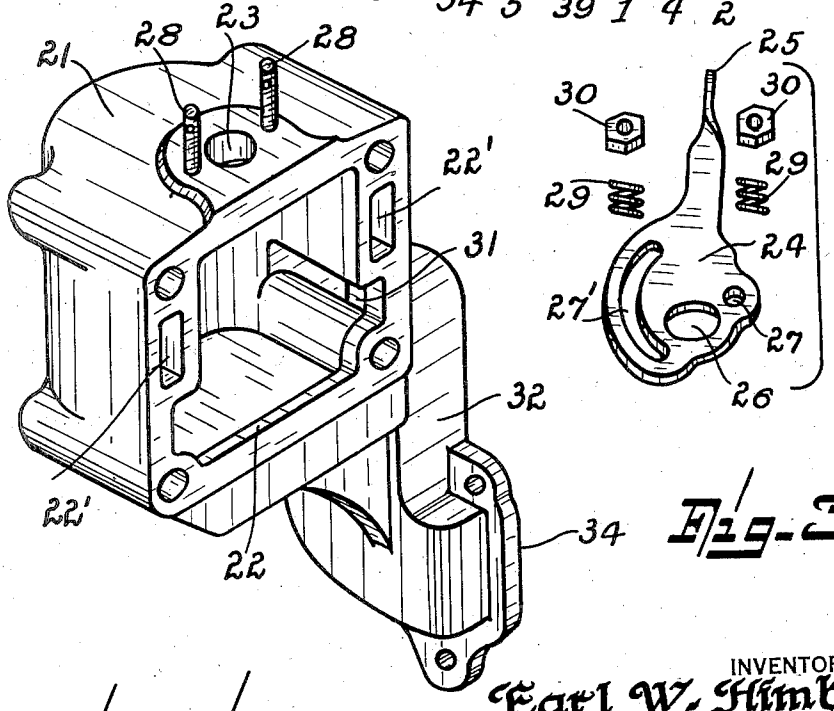


Fig. 2

Fig. 3

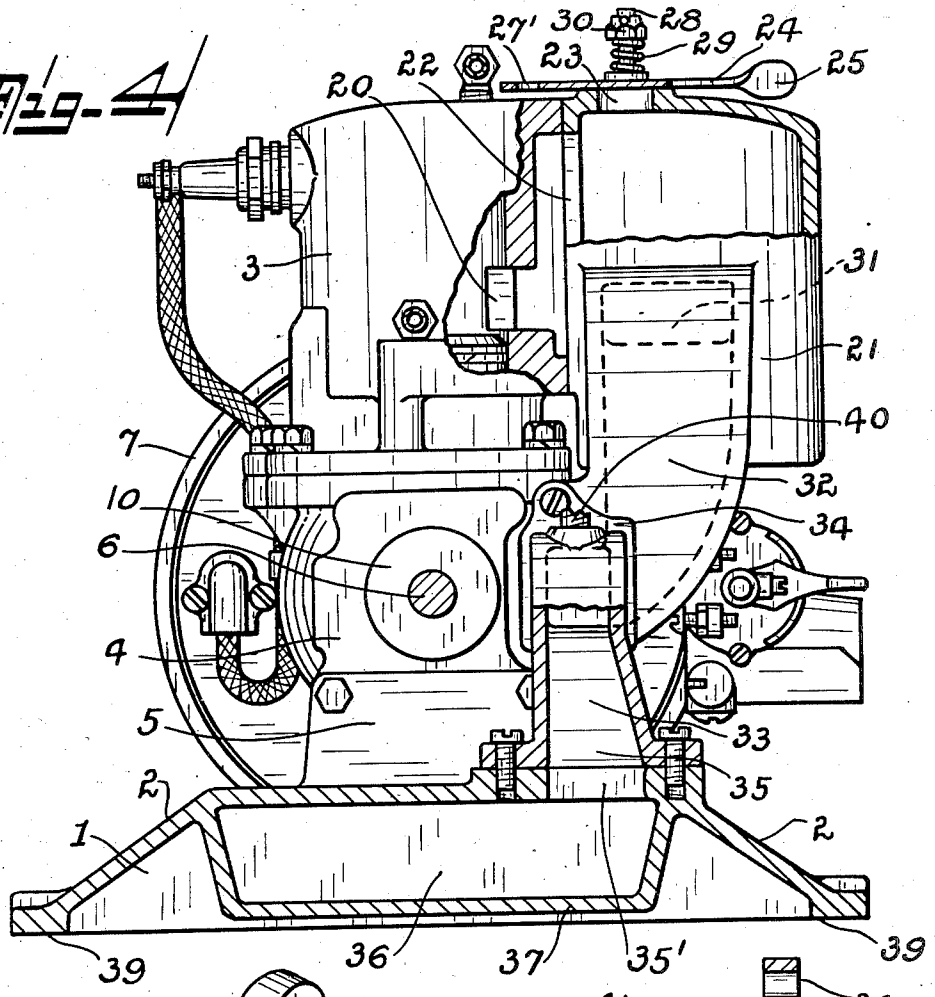
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Fig. 4



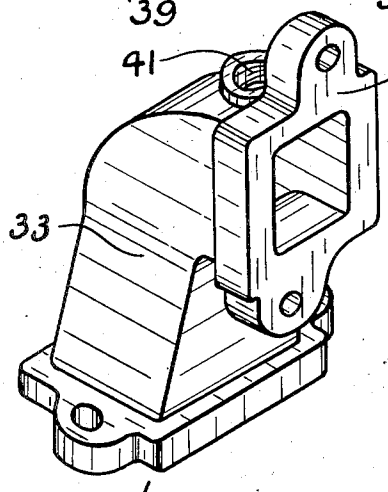
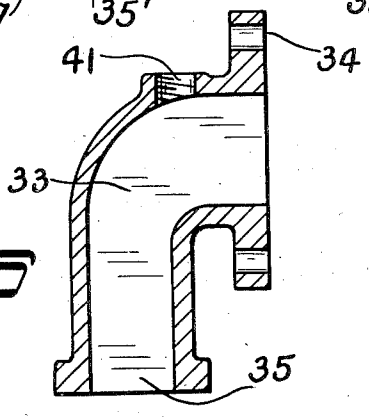


Fig. 5

Fig. 6



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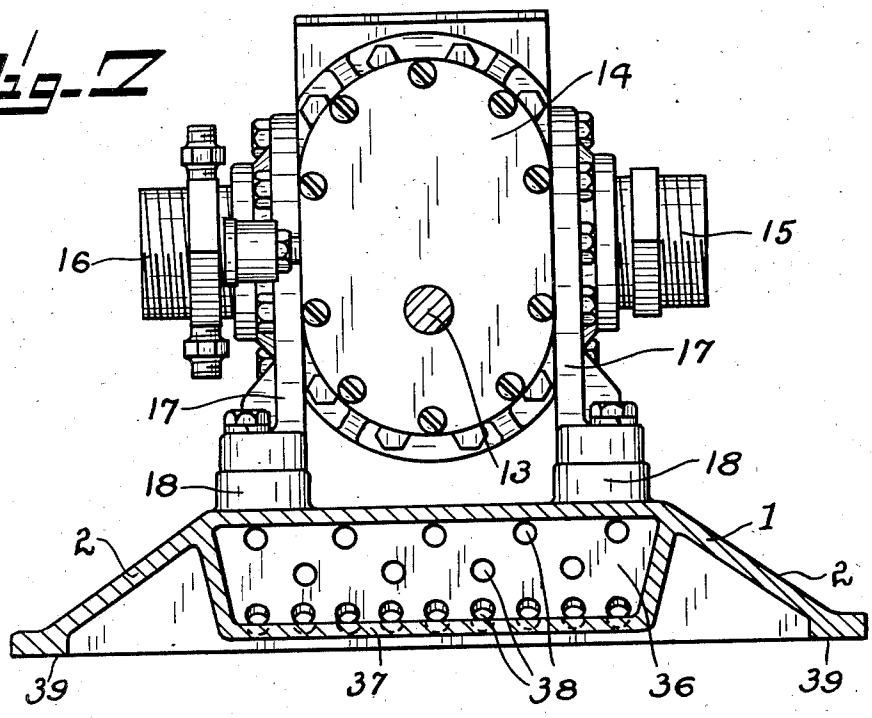
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Fig. 7



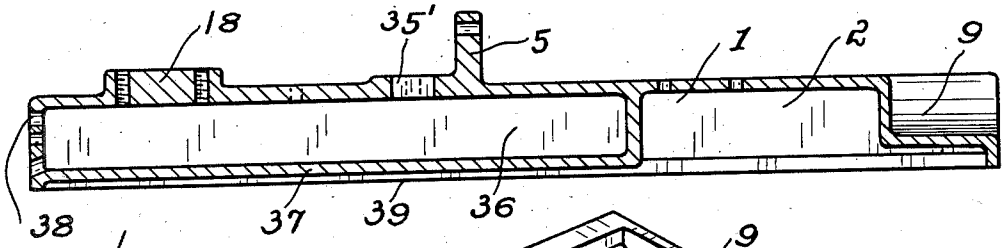


Fig. 8

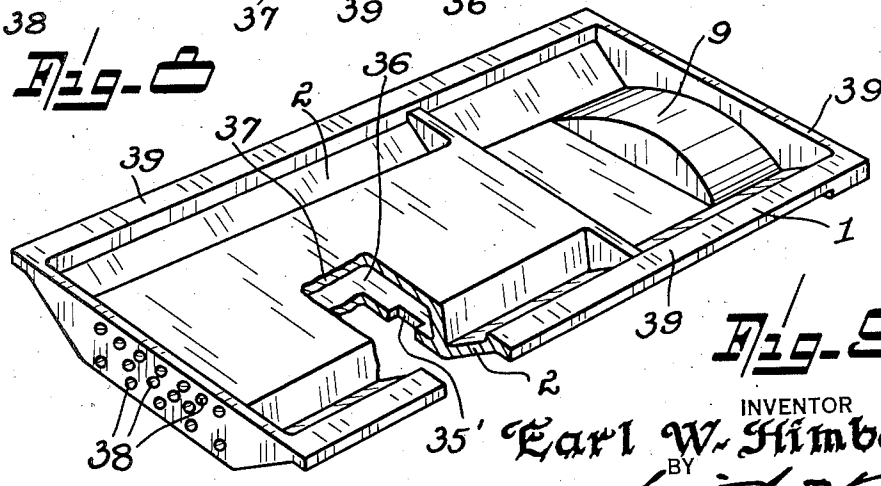


Fig. 9

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Patented June 23, 1936 2,044,849

UNITED STATES PATENT OFFICE

2,044,849

PORTABLE PUMPING UNIT

Earl W. Himberger, Seattle, Wash.

Application July 9, 1935, Serial No. 30,453

4 Claims. (Cl. 123—195)

My present invention relates to an improved portable pumping unit which is fashioned of compactly arranged parts that cooperate to insure an efficient apparatus of this nature, and which is sufficiently light in weight as to be readily transported by person, as for instance a woodsman. The pumping unit includes a high speed gasoline motor which supplies power for the water pump which is preferably a rotary gear pump of the type adapted to be coupled with the outboard type of gasoline motor.

Under the conditions existing heretofore, motors of this type, and others adapted for my purpose, create a terrific and annoying exhaust report or noise, which in many cases is objectionable and undesirable, except as will hereinafter be pointed out. To eliminate the noise of the exhaust when such noise is undesirable and objectionable, I provide the gasoline motor with a number of successive expansion chambers and exhaust chambers, wherein the exhaust gas is expanded and its pressure reduced to a minimum before escaping to the atmosphere, thereby entirely eliminating the noise as an objectionable feature. The walls of the expansion chambers and of the exhaust chamber are also utilized as braces for the unit structure to assure strength and compactness, together with durability and ruggedness for the pumping unit.

Under my improved conditions, the pumping unit is especially well adapted for various purposes, as fire fighting equipment; as a stationary plant for pumping water for irrigating purposes and landscape engineering on large estates; and for various emergency uses, either domestic or industrial.

In the improved pumping unit I also provide means for control of the exhaust gases issuing from the gasoline motor so that the elimination of noise may be dispensed with, as for instance when a number of the coupled units are spaced apart and employed for pumping a line of water or a stream of water over a comparatively long distance. Under these conditions it is frequently desirable that the motors shall give an audible signal, indicating that they are properly operating, so that fire-fighters in the forest, may, without necessity for close inspection and attendance, know that the motors are operating. To meet this condition, the exhaust gas is cut off from the expansion chambers and the gas is permitted to exhaust directly from the first expansion chamber to the atmosphere, thereby giving an audible safety signal.

My invention consists in certain novel combinations and arrangements of parts in the portable pumping unit as will hereinafter be more fully set forth and claimed. In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention wherein the parts are combined and arranged according to one mode I have devised for the practical application of the principles of my invention.

Figure 1 is a perspective view of the portable pumping unit involving my invention, in position for use as a stationary pumping plant.

Figure 2 is a detached, enlarged, perspective view of the casting forming the first reduction or expansion chamber for exhaust gases, provided with an outlet or direct-exhaust port.

Figure 3 is a perspective view of the control valve for the direct exhaust port of Figure 2, showing also springs and nuts employed with the valve.

Figure 4 is a view in elevation, and partly in section, with parts broken away, to illustrate the means for expanding and conveying the exhaust gases, this view is substantially a cross-section of Figure 1 taken between the gas tank and the motor, looking toward the right.

Figure 5 is a perspective view of another casting forming an expansion chamber for the exhaust gases, and Figure 6 is a vertical sectional view of the casting.

Figure 7 is a transverse sectional view of the unit looking toward the left in Figure 1, showing the rotary gear-pump and shaft and also the large and final exhaust chamber.

Figure 8 is a longitudinal vertical sectional view of the base casting for the unit, and Figure 9 is a perspective view of the base casting, turned upside down.

As indicated, the base 1, which is of light but strong cast metal is of generally rectangular shape, with sloping sides 2, 2, to provide a comparatively wide foundation for the unit when the latter is in position for use as a stationary pumping plant, and the gasoline engine 3, of the reciprocating, outboard or marine type is provided with a rigid crank case 4 that is rigidly bolted to the transversely extending flange 5 integral with the top of the base, and located at the approximate longitudinal center of the base.

The motor shaft 6 extends in a plane parallel with the base 1, and is provided at one end with the usual fly wheel or balance wheel 7 and a grooved pulley 8 for use with a belt or with a power rope or other device. At one end the base is fashioned with an arcuate depressed wall 9,

to accommodate the fly wheel in order that the motor or engine and its shaft may be brought as near as possible to the base for a low center of gravity in the unit, and the engine shaft 6 is journaled in suitable bearings 10 rigid with the walls of the crank case 4.

To compensate for vibrations between the engine or motor and the pump, a flexible shaft-coupling is employed comprising a coupling member or head 11 and a complementary head 12, the head 11 being preferably a non-metallic head, and the head 12 of the engine shaft being a metallic head. The coupling head 11 is rigidly mounted on the pump shaft 13, which forms the drive or main shaft of the rotary gear pump that is enclosed in the pump casing 14, and the latter is provided with laterally extending intake and discharge pipes 15 and 16.

The pump casing, which is located in position at the end of the base opposite to the engine and fly wheel to equalize and distribute the weight of the unit, is rigidly mounted on the base through the use of two bracket plates 17, 17 at opposite sides of and parallel with the longitudinal axis of the base, and these bracket plates are bolted to bosses 18 on the upper face of the base 1.

The tank 19 for the gasoline supply to the engine or motor is mounted rigidly over the pump casing, along the longitudinal axis of the base 1, and provided with a filling port, and the usual outlet port and pipe from the tank supply the engine with fuel.

In Figure 4, where the engine is broken away for convenience of illustration a lateral exhaust port 20 is shown in the cylinder wall, and at the side of the engine in which the port is located a high-pressure expansion casing 21 is bolted. This high pressure casing is provided with an open side 22 which is attached to the engine and forms the intake port to the casing from the exhaust port 20 of the engine, the intake port being substantially larger in size than the exhaust port in order that the exhaust gases may quickly flow into the casing after the explosion in the engine, and the casing is provided with the usual water jacket 22' for cooling purposes.

When it is desirable that an audible exhaust from the engine, for any reason, is in order, I utilize an exhaust port 23 located in the top wall of the casing 21, and controlled by a pivoted plate or valve 24 having a handle 25 at one end. The valve-plate, which has a port 26 adapted to register with the exhaust port 23, is pivoted on the casing at 27 and provided with an arcuate guide slot 27' and two pins or bolts 28 one serving as a pivot for plate 24, engaging hole 27 and the other engaging slot 27' and serving as a stop to limit the rotation of plate 24. Springs 29 and nuts 30 are mounted on the bolts, and the springs are interposed between the nuts and the plate to hold the latter against the flat top portion of the casing and thus guide it during its operation. By swinging the plate on its pivot to bring the port 26 into register with port 23, it will be obvious that the exhaust gas may pass through the registering ports with the usual popping sound as a signal that the engine is operating. By closing the auxiliary valve, the flow of gas is cut off, and the gas is permitted to expand within the comparatively large high pressure expansion chamber 21.

As best seen in Figure 2, and by dotted lines in Figure 4, the casing 21 is fashioned with a lateral interior port 31, which opens into a conduit 32, integral with and projecting below at one side of the casing 21, and this conduit 32 together with the flaring expansion chamber 33 form low pressure expansion means for the exhaust gas from the casing 21. The casing 32 and the flaring chamber or casing 33 each have complementary flanges 34 through which bolts are passed for rigidly attaching the flaring chamber to the conduit, and the angular flaring casing 33 is provided with a bottom outlet port 35 which opens through a port 35' located at one side of the top of the base into the interior of the exhaust chamber 36 formed by means of the web 37 under the top plate of the unit-base 1. At one end of the base 1, in its perpendicular wall, are provided outlet ports 38 that open to the atmosphere, and the spent gases of combustion issue through the holes or ports from the interior of the exhaust chamber 36.

In this manner the exhaust gases from the engine pass through a tortuous route from the cylinder of the engine to the exhaust chamber 36, gradually losing pressure, and the spent gases issue through the holes or outlet ports with a continuous hissing sound rather than the popping sound of the exhaust.

The casing 21, the conduit 32, and the flaring casing 33, are rigidly joined together, and they rigidly join the engine block with the unit base, bolts of course being employed for joining together the several parts, thus dispensing with the use of special braces for the engine and base.

The web 37, which is depressed below the top of the base 1 for the purpose of forming the separated and enclosed final exhaust or expansion chamber for the gases of combustion, also forms a brace for strengthening the base over a major portion of its length, while the depressed arcuate wall 9 that accommodates the flywheel, also forms a brace and reinforcement for the base at one end of the latter.

Both the flat web 37 of the exhaust chamber and the rounded web 9 of the depression, as best seen in Figure 9, are slightly elevated above the edge flanges 39 of the base, in order that the base may rest on its flanges, and not on the webs, and thereby more readily provide a stable support for the unit.

It has been found desirable to lead the cooling water from the engine into the base chamber 36. This is accomplished by the cooling water discharge pipe 40 which leads from the top of the engine cylinder to member 33 where it enters through boss 41. The water thus deposited in the exhaust chamber 36 serves to prevent any excessive temperature rises in base 1. This is a matter of considerable importance in view of the fact that aluminum alloys are used in this construction for lightness and if the temperature was allowed to rise, as it normally would due to the exhaust heat of the engine, dangerous stresses might be set up in the base casting 1. The water is discharged along with the exhaust gases from openings 38. The lower row of which is disposed at the extreme bottom of chamber 36 as is probably best illustrated in Figures 7 and 8.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a pumping unit, the combination with a base and an enclosing, ported, web, forming an exhaust chamber, and a gasoline engine rigidly mounted on the base and provided with an exhaust port, of a high-pressure expansion casing bolted to the engine and communicating with said port, an auxiliary valve device for controlling passage of gases from one portion of the

casing, a depending conduit integral with the casing and communicating therewith at another portion of the casing, and a low pressure casing bolted to said conduit and base and communicating with said elements of the unit.

2. In a pumping unit, the combination with a base having an enclosing web forming a ported exhaust chamber in the base, a transversely arranged flange integral with the top portion of the base, an engine, and a crank case rigid with the engine and bolted to said flange, of a high-pressure expansion casing bolted to the engine and having an intake port open to the exhaust port of the engine, a depending, integral conduit opening to the interior of the casing, and a low pressure, downwardly flaring casing bolted to said conduit and base and opening into each.

3. In a pumping unit a hollow base of generally rectangular shape having sloping lateral walls and perpendicular end walls one of which is perforated, a flat web extending throughout a major portion of the length of the base and having side walls forming an exhaust chamber with the base portion, an arcuate web depending transversely of one end of the hollow base, an engine having a crank case rigidly mounted on the base, and a succession of casings rigidly bolted together and bolted to said engine and hollow base, and said casings forming a tortuous passage for exhaust gases from the engine to the atmosphere.

4. In a pumping unit the combination with a gasoline engine having an exhaust port, an engine base having an exhaust chamber, a crank case for the engine, and means for rigidly mounting the crank case on the base, of a high pressure expansion chamber and casing bolted to the engine and open to its exhaust port, said casing having an outlet port, a pivoted, spring-pressed ported valve plate mounted on the casing for controlling the outlet port, and a succession of casings rigidly bolted together and bolted to said engine base and high pressure casing to form a tortuous passage for exhaust gas from the engine to outlet ports in the exhaust chamber of the base.

EARL W. HIMBERGER.