976,133.

H. M. MINNIS.

FIRE ENGINE.

APPLICATION FILED AUG. 16, 1909.

Patented Nov. 15, 1910.

2 SHEETS—SHEET 1.

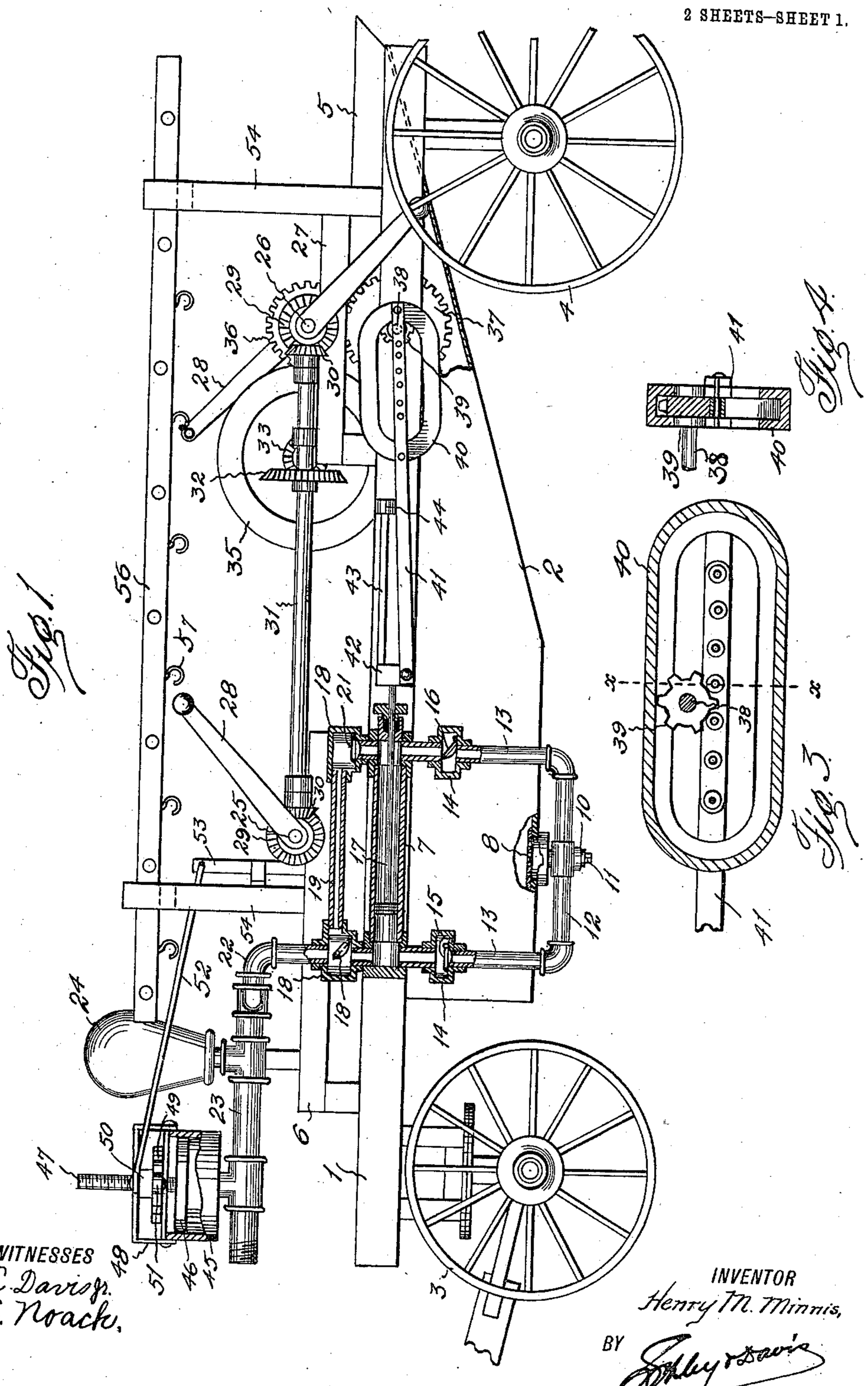

Fig. 1.

Fig. 2.

Fig. 3.

WITNESSES

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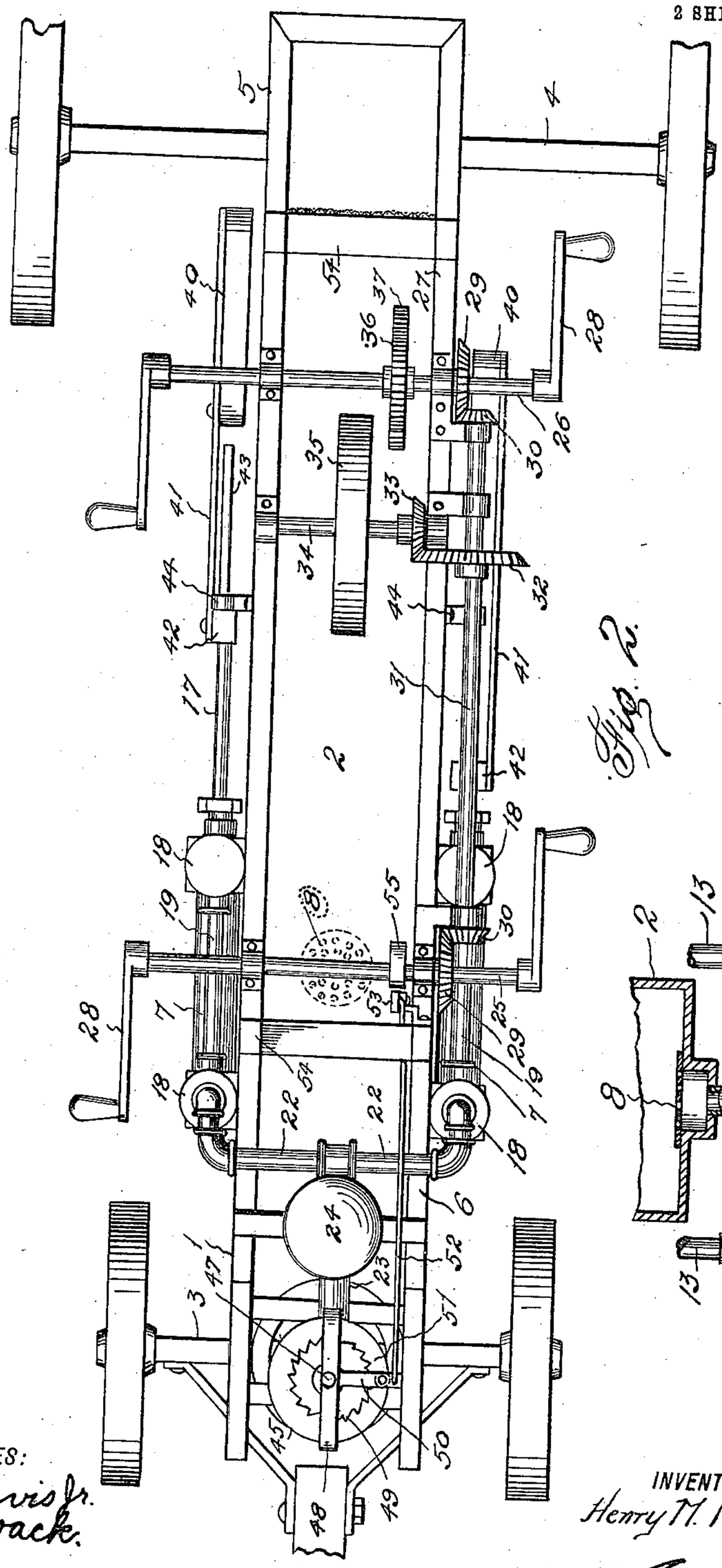

Fig. 2.

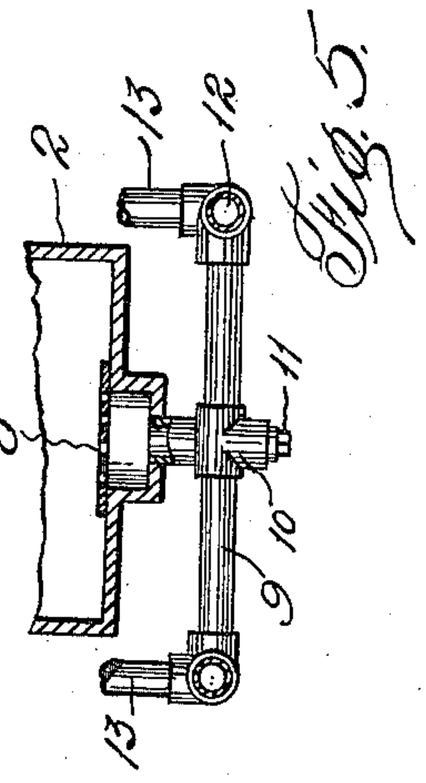

Fig. 5.

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UNITED STATES PATENT OFFICE.

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FIRE-ENGINE.

976,133. Specification of Letters Patent. Patented Nov. 15, 1910.

Application filed August 16, 1909. Serial No. 512,980.

To all whom it may concern:

Be it known that I, HENRY M. MINNIS, a citizen of the United States, residing at Wylie, in the county of Collin and State of Texas, have invented a new and useful Improvement in Fire-Engines, of which the following is a specification.

My invention relates to new and useful improvements in fire engines.

The object of the invention is to provide a fire engine designed particularly for rural use and in places where there are no water mains or a volume of water under pressure.

Other features are the provision of a portable fire engine equipped with a suitable storage tank; the provision of a double acting pump so connected and geared as to eject the water under a comparatively high pressure with a minimum amount of power; and provision for introducing a suitable fire extinguishing chemical into the water after the same leaves the pump.

Finally the object of the invention is to provide means of the character described that will be strong, durable, efficient, and easy of operation, simple and comparatively inexpensive to construct, and also in which the several parts will not be likely to get out of working order.

With the above and other objects in view, the invention has relation to certain novel features of construction and operation, an example of which is described in this specification and illustrated in the accompanying drawings, wherein:

Figure 1 is a side elevation with the chemical receptacle and pump in section, Fig. 2 is a plan view, the ladder removed, Fig. 3 is a detail of the mangle rack gearing, and Fig. 4 is a transverse vertical section of the same on the line *x*—*x* of Fig. 3, Fig. 5 is a detail of the outlet from the tank on a plane at right-angles to Fig. 1.

In the drawings, the numeral 1 designates a central longitudinal frame mounted at its forward and rear ends on suitable running gears, 3 and 4 respectively. An underhung tank 2 is suspended from the frame and has its bottom at the rear portion, gradually inclined upward and terminating beneath a hopper 5 over the rear running gear 4. Near the forward end of the frame, a secondary frame is mounted thereon. On each side of the main frame 1, a horizontal pump cylinder 7 is mounted adjacent the forward end of the tank 2. In the central forward portion of the bottom of the tank, a screened outlet 8 is provided. A supply pipe 9 beneath the tank extends transversely under the outlet with which it is connected. A hose connection 10 normally closed by a plug 11 is included in the pipe 9 below the outlet for the purpose of connecting with a well or other source of supply when the tank has been emptied, although this connection is only used in drawing water from shallow wells and other sources where little power is required to lift the water. In most instances I prefer to maintain water in the tank 2 by introducing it through the hopper 5 from buckets or other suitable means.

At each end the supply pipe has connection at the center with a longitudinal branch pipe 12, the pipe 12 on each side lying directly beneath the pump cylinder 7. At each end the branch pipes have connection with vertical lead pipes 13, those on each side of the frame having connection with the pump cylinder, one pipe being connected to the forward end of the cylinder and the other pipe to the rear end. As the pump connections and operating means on each side are substantially the same, a description of one will suffice for both. Below the pump cylinder valve casings 14 are mounted in the pipes 13. In the forward valve casing a hinged valve 15 is arranged, while in the rear casing a similar valve 16 is mounted. A plunger 17 is mounted to reciprocate in the cylinder and is operated by means hereinafter described.

Immediately over each end of the pump cylinder valve casings 18 having connection with the cylinder and connected by a horizontal pipe 19, are mounted. In the forward casing a valve 20 is hinged while in the rear casing a valve 21 is arranged, these valves being like the valves 15 and 16. From the forward valve casing 18 of each cylinder, a branch pipe 22 leads to a common discharge pipe 23 on which is mounted an air chamber 24.

Referring to Fig. 1 it will be seen that during the forward stroke of the plunger 17, the valve 16 is open and water drawn into the cylinder 17, the valve 21 being closed; while water ahead of the plunger is forced past the valve 20. On the rearward stroke the positions of the valves are re-

versed, 16 and 20 being closed and the water ahead of the plunger being forced past the valve 21 and through the pipe 19. It is obvious that each pump will eject a continuous stream of water.

As before stated one of the objects of this invention is to discharge a continuous stream of water at a comparatively high pressure with a minimum amount of power. This is especially desirable where the pumps are manually operated, but is of course also desirable when the pumps are operated by a motor or engine. In carrying out this portion of the invention a transverse crank shaft 25 is mounted on the secondary frame 6, while a similar shaft 26 is mounted on a secondary frame 27 supported on the main frame 1. These shafts are provided at each end with a crank handle 28 by which the operators turn the shafts. On each shaft a miter gear 29 is fastened each meshing with a miter gear 30 fixed on the end of a counter-shaft 31 suitably supported on the secondary frames. On this counter-shaft near the frame 27 a miter gear 32 is fixed and meshes with a miter pinion 33 fixed on a horizontal-shaft 34 on which a suitable fly wheel 35 is mounted.

On the shaft 26 a spur gear 36 is fastened inside of the frame and directly over a larger gear 37 with which it meshes, and which gear 37 is keyed on a shaft 38 mounted in the frame 1 and projecting on each side thereof. On each projecting end of the shaft 38 a pinion 39 is fixed and arranged to travel in a mangle rack 40 as shown in Figs. 3 and 4. Motion being imparted to the gears and shafts, the pinions 39 are rotated, but about a fixed axis thus causing the mangle racks to travel about the pinions and to impart a reciprocating movement to links 41 connected to the racks at their rear ends. Each link at its forward end is connected to a block 42 attached to the adjacent plunger 17, while a guide rod 43 extending rigidly rearward from the block has its free end supported in a bearing 44 secured to the side of the main frame. It is evident that the pinions 39 will make several complete revolutions, depending upon the length of the racks, which in the present instance are designed to make two revolutions to one complete movement of the racks, or in other words a complete revolution to each stroke of the plungers. In this way the crank shafts may be rotated by a comparatively small amount of energy and sufficient power transmitted to the pump plungers to cause a discharge of water at a comparatively high pressure.

For introducing a suitable fire extinguishing chemical into the water as it is discharged a cylindrical receptacle 45 is mounted on the pipe 23 forward of the air chamber 24. The chemical or composition is placed in this receptacle and forced into the pipe 23 so as to mix with the water as it is discharged. This is accomplished by placing in the receptacle a circular follower head 46 from the center of which a screw 47 extends up through a bracket 48 fixed on top of the receptacle. In this bracket a ratchet wheel 49 is confined against vertical movement but is free to rotate and has screw threaded engagement with the screw. A laterally extending arm 50 loosely confined about the screw projects over the edge of the ratchet wheel and carries a pawl 51 which engages with the teeth of the ratchet. This arm is swung and motion imparted to the ratchet wheel by a link 52 connected at one end with the arm and at the other end attached to the upper end of a vertical lever 53. This lever 53 is pivoted intermediate its ends to the one of the forward ladder supports 54, while its lower end projects into the path of an eccentric 55 mounted on the shaft 25. As the ratchet wheel is thus intermittently rotated, the screw 57 is turned and the follower head 46 moved down into the receptacle thereby forcing the contents gradually into the pipe 23. A suitable ladder 56 may be carried on the supports 54 and hooks 57 provided on the ladder for attaching various articles of the equipment.

What I claim, is:

1. The combination in a fire engine, of an elongated portable frame, an under hanging tank supported by the frame and having an outlet in its bottom, a pump cylinder secured to each side of the frame, pipe connections leading from the bottom of the tank to the pump cylinders, valves included in the pipe connections between the tank and the cylinders, a discharge pipe at the forward end of the frame, pipe connections between the pump cylinders and the discharge pipe, valves included in the last named pipe connections, a piston operating in each cylinder, and means for operating the pistons.

2. The combination in a fire engine, of a long narrow portable frame, a tank conforming to the general shape of the frame secured along its top edge to the frame and hanging thereunder, the tank having an outlet near its forward end, a pump cylinder secured on each outer side of the frame, a supply pipe extending under the tank and having connection with the outlet, pipe connections extending up the outside of the tank from the supply pipe on each side of the tank to the pump cylinders, a discharge pipe at the forward end of the frame, pipe connections leading from the cylinders to the discharge pipe, an air chamber mounted on the discharge pipe, pistons operating in the cylinders, and means mounted on the frame for operating the pistons.

3. The combination in a fire engine, of a

portable frame, a tank hung under the frame having an outlet in its bottom, pump cylinders, one secured on each side of the frame, connections from the outlet of the tank to each cylinder, a discharge pipe, connections from each cylinder to the discharge pipe, the connections and cylinders being disposed outside of the tank, a piston working in each cylinder, a connection on each side of the frame engaged with the piston on said side for operating the piston, a horizontal shaft mounted on the frame, means for transmitting motion from the shaft to the connections, and means for imparting motion to the shaft.

In testimony whereof I have signed my name in the presence of two witnesses.

HENRY M. MINNIS.

Witnesses:
L. E. NOACK,
JACK A. SCHLEY.