United States Patent

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[54] **STEAM ENGINES**
2 Claims, 5 Drawing Figs.

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[50] **Field of Search** 60/27, 15; 123/51, 50, 60

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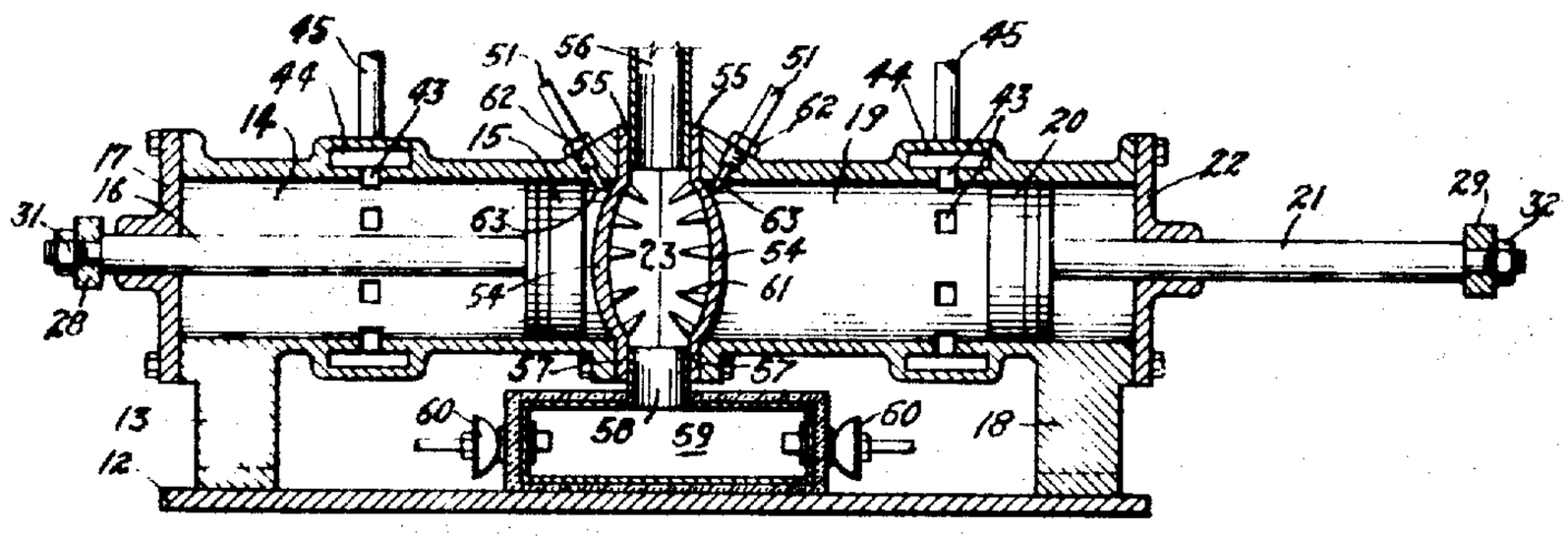
ABSTRACT: Two axially aligned cylinders joined to and projecting oppositely outward from the opposite sides of an externally fueled heating chamber. A piston in each cylinder and a piston rod projecting outwardly from each piston through the outer extremities of the cylinders. A longitudinally reciprocating piston frame connecting the outer extremities of the two piston rods so that said pistons move in unison. Means for alternately projecting jets of water against the heating chamber within said cylinders to produce charges of steam to alternately urge said pistons outwardly to impart rotation to a power shaft.



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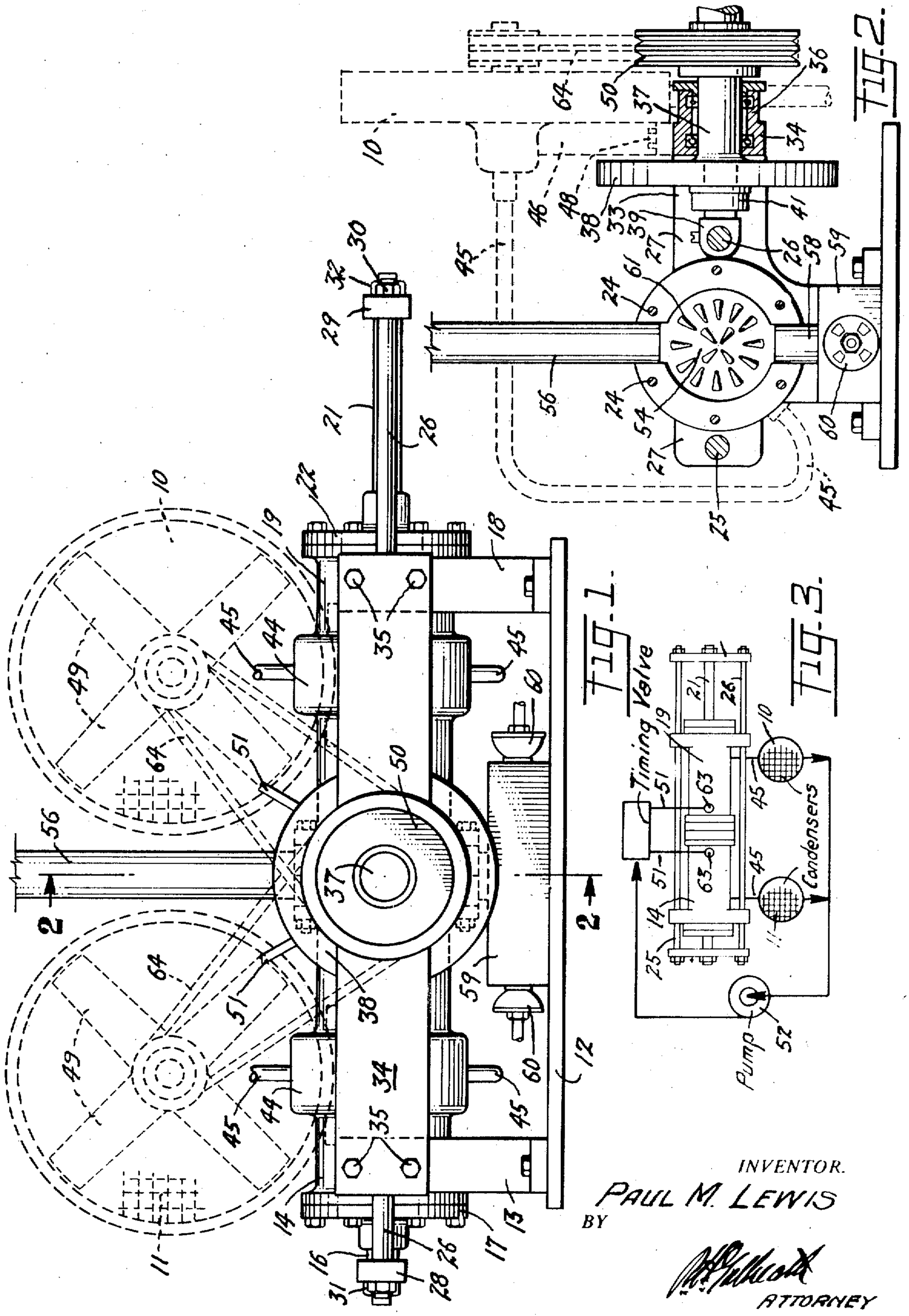

FIG. 1.

FIG. 2.

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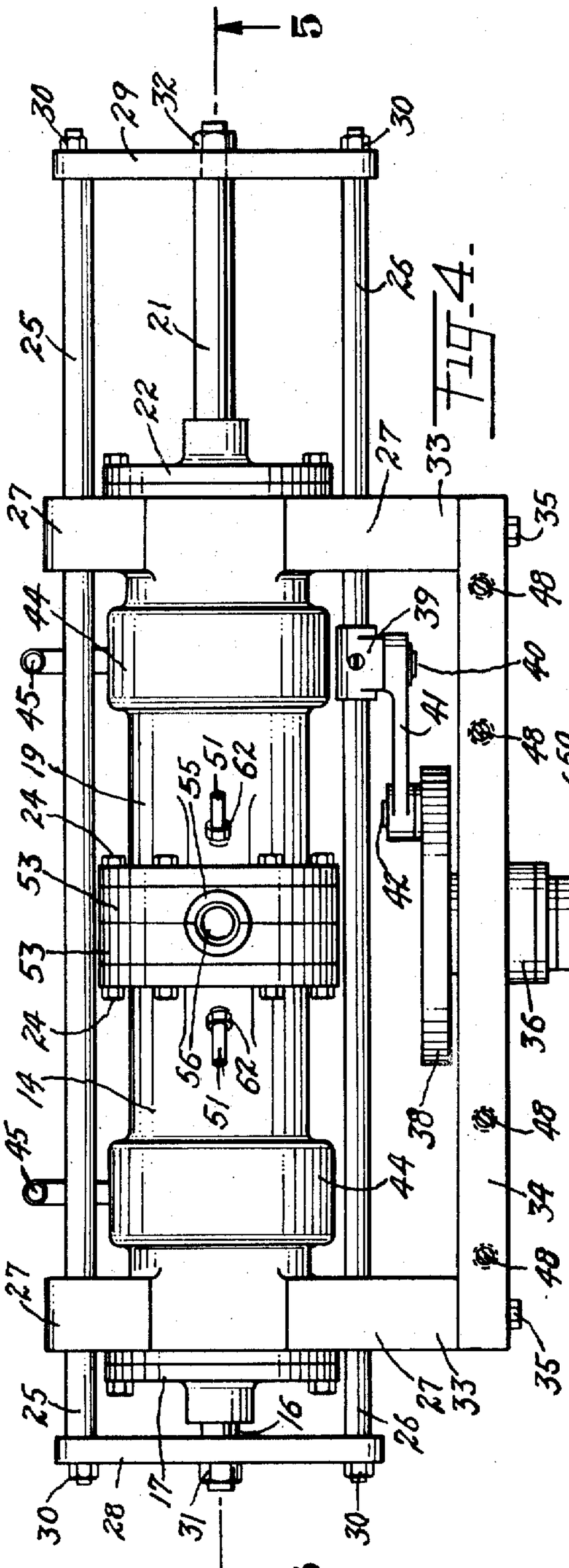

FIG. 4.

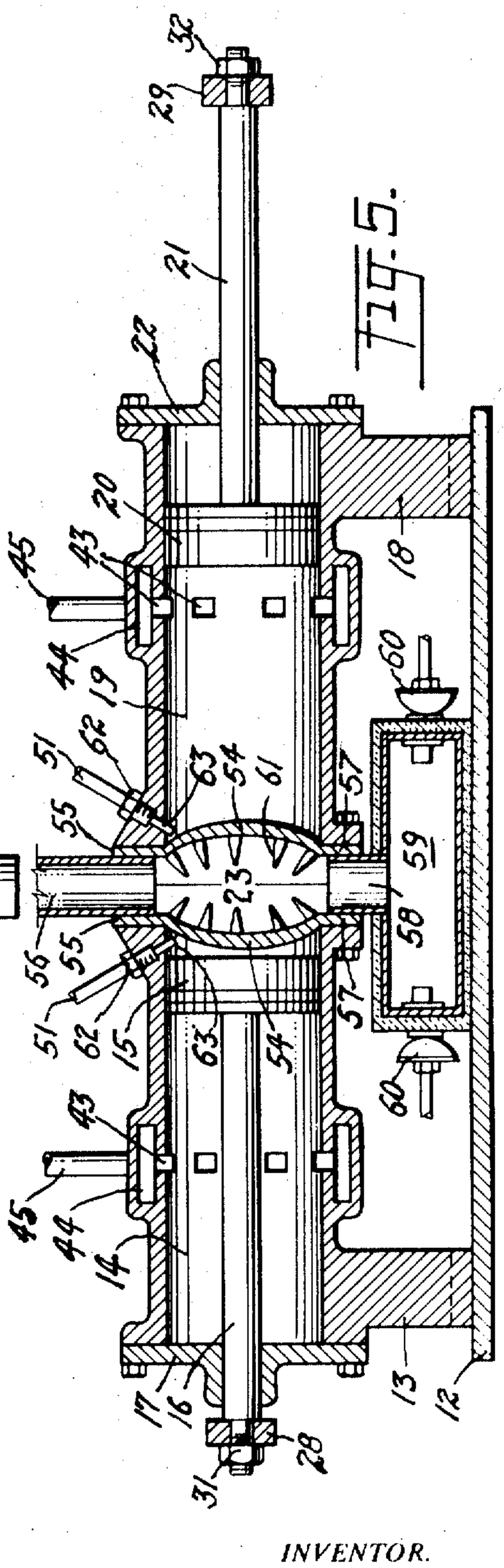

FIG. 5.

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STEAM ENGINES

This invention relates to a steam motor in which timed shots of water are sprayed against heated surfaces within the motor cylinders to produce intermittent charges of steam for driving the pistons therein.

The principal object of this invention is to eliminate the steam boilers usually employed with steam engines and to eliminate the carburetion devices, ignition devices and mechanically operated valves usually employed in internal combustion engines so as to produce an exceedingly simple, economical, self-contained, and highly efficient power unit which will be conveniently adaptable for use in motor vehicles.

A further object is to provide an engine for motor vehicles the exhaust of which will be clean and free from carbon or carbon oxides or other objectionable smog-producing ingredients.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is made to the accompanying drawings which form a part hereof. Like numerals refer to like parts in all views of the drawings and throughout the description.

In the drawings:

FIG. 1 is an end elevational view of the steam motor of this invention;

FIG. 2 is a cross section taken on the line 2–2, FIG. 1;

FIG. 3 is a flow diagram showing the paths of flow of the water to and through the motor;

FIG. 4 is a top plan view of the motor; and

FIG. 5 is a longitudinal section therethrough taken on the line 5–5, FIG. 4.

In FIGS. 1 and 2 two fan-type condensers 10 and 11 have been shown in broken line mounted upon, and driven by, the motor. This simply suggestive of a convenience mounting. The condensers are of any suitable conventional type and may be mounted independent of the motor if more desirable. They have been omitted from FIGS. 4 and 5.

The motor comprises: a baseplate 12 supporting, by means of a pedestal 13, a first cylinder 14 slidably containing a piston 15, from which a piston rod 16 projects through a first cylinder head 17; and supporting, by means of a second pedestal 18, a second cylinder 19, slidably containing a second similar piston 20, from which a second similar piston rod 21 projects through a second cylinder head 22. The inner extremities of the two cylinders are open and the heads 17 and 22 close the outer extremities thereof. The cylinders are axially aligned and the open inner extremities thereof are clamped against the opposite sides of a hot-box chamber 23 by means of suitable clamp bolts 24.

The pistons are caused to move in unison by means of a longitudinally movable piston frame consisting of two similar parallel slide rods 25 and 26, which slide through aligned guide bearings 27 formed on the opposite sides of the cylinders. The slide rods 25 and 26 are joined in spaced relation at their extremities by means of cross bars 28 and 29 attached thereto by means of clamp nuts 30. The piston rod 16 of the first cylinder 14 is medially attached to the crossbar 28 by means of clamp nut 31 and the piston rod 21 is similarly attached to the cross bar 29 by means of a similar clamp nut 32. The relation between the length of the slide rods and the length of the piston rods is such that when either piston is at its innermost firing position the other piston will be at its outermost exhaust position as shown in FIG. 5.

The guide bearings 27 at one side of the cylinders extend radially outward, as shown at 33, and an elongated shaft-supporting bar 34 extends horizontally between and is secured to the outwardly extending portions 33, by suitable attachment studs 35, to medially support a conventional cantilever-type shaft bearing 36 in which a power shaft 37, provided with a fly wheel 38, is journaled.

The reciprocating movements of the piston frame are transmitted to rotational movement of the power shaft by means of a wristpin clamp 39 which is secured to the slide rod 26 to support a wristpin 40 for a connecting rod 41 which extends to an eccentrically positioned crank pin 42 on the flywheel 38. It can be seen from the above that reciprocation of the pistons will cause rotation of the shaft 37 through the conventional medium of the connecting rod 40.

The cylinders 14 and 19 are of the two-cycle type, that is, each cylinder is provided with exhaust ports 43 in its walls which communicate with an annular exhaust steam passage 44 which surrounds the cylinder and from which the expanded steam is conducted by means of an exhaust steam pipe 45 to suitable condensation equipment for recyclement. As illustrated, the exhaust steam pipe 45 of each cylinder conducts the spent steam to the heat exchange core of one of the conventional condensers 10 or 11 supported by structural posts 46 attached to the shaft supporting bar 34 by means of suitable attachment screws 48. The condensers are provided with cooling fans 49 driven by V-belts 64 from a V-belt pulley 50 on the power shaft 37. The condensate is discharged from the condensers through water pipes 51 and is returned to the working cycle by means of a suitable pump 52 which may be also driven by the V-belt pulley 50 if desired.

The hot-box chamber 23 is formed from two similar substantially rectangular metallic burner blocks 53 each having: a circular concavo-convex sidewall 54, which protrudes into the open extremity of the adjacent cylinder; a semicylindrical top sleeve 55, which is clamped about and vertically supports a flue stack 56; and a semicylindrical bottom sleeve 57 which is clamped about a heat outlet 58 extending upwardly from an insulated gas burner chamber 59. One or more conventional gas burners 60 or other types of externally fueled heating elements are installed in the burner chamber. The heating elements are of sufficient capacity to heat the concavo-convex walls 54 to from 1,000° F. to 2,000° F. The inside concave faces of the sidewalls 54 are preferably provided with flame protuberances 61 or metallic foam to increase the area of the heat exchange surface for more effective heat exchange.

The inner open extremity of each cylinder is provided with a nozzle nipple 62 from which a jet nozzle 63 projects so as to intermittently and alternately direct measured and timed jets or sprays of water from the water pipes 51 against the convex surfaces of the heated walls 54 of the hot-box chamber 23 to instantly produce steam pressure for alternately actuating the pistons in their respective cylinders.

The jets may be timed and measured by any conventional timing valve, such as the well-known valves in which liquid fuel oil is fed to engines of the injection or diesel type. It is believed the structure of the improved steam motor can be best understood from a brief description of its operation.

OPERATION

Let us assume that the burners 60 are operating to maintain the convex sidewall surfaces 54 of the burner blocks 53 at a sufficient temperature to instantly superheat steam (say from 1,000° F. to 2,000° F.) and that the pistons are in the position shown in FIG. 5. Now, let us assume that a relatively short spurt of water is sprayed from the jet nozzle 63 in cylinder 14 against the superheated sidewall 54 of that cylinder. When the dispersed globules of water in the spurt, some of which are microscopic in size, strike the hot surface they instantaneously flash and explosively expand into an almost gaseous form of steam to force the piston 15 outwardly in the cylinder 14 and the piston 20 inwardly in the cylinder 19. When the piston 15 uncovers the exhaust ports 43 the residual pressure from cylinder 14 will be discharged to the condenser of that cylinder for condensation and return to the working cycle. A water jet will now be sprayed from the jet nozzle 63 against the opposite sidewall 54 and the entire cycle will be repeated relative to cylinder 19 to provide continuous rotation of the power shaft.

While a specific form of the invention has been described
l illustrated herein, it is to be understood that the same may
varied within the scope of the appended claims, without de-
ting from the spirit of the invention.
Having thus described the invention what I claim and desire
be secured by Letters Patent is:
. A steam motor comprising:
. a hot-box chamber having two oppositely positioned and
internally heated sides;
. a cylinder secured at its inner extremity to, and extending
outwardly from, each side of said hot-box chamber in
axial alignment with each other;
. a cylinder head closing the outer extremity of each
cylinder;
. a piston in each cylinder provided with a piston rod ex-
tending outwardly through the cylinder head of that
respective cylinder;
connecting means securing said piston rods together ex-
ternally of said cylinders so that as each piston moves in-
wardly toward said hot-box chamber the other piston will
simultaneously move outwardly away from said chamber;
jet nozzles in said cylinder for alternately directing jets of
water against the heated sides of said hot-box chamber to
create intermittent charges of steam in said cylinders to
force the pistons alternately outward so as to reciprocate
said connecting means;
a power shaft;
transmission means acting to rotate said power shaft in

consequence of the reciprocation of said connecting means;
i. means for exhausting said charges of steam from said cylinders at the termination of the outward movements of said pistons;
j. said hot-box chamber comprising two similar burner blocks;
k. a circular sidewall in each burner block;
l. means for clamping said two blocks together with said sidewalls in axially spaced-apart relation and for simultaneously clamping the inner extremities of said two cylinders externally against, and in axial alignment with, said side walls;
m. a burner chamber provided with heating means positioned adjacent to and opening to the intervening space between said sidewalls,
n. gas burners positioned in said burner chamber; and
o. an exhaust stack opening from said intervening space to discharge the spent gas therefrom.
p. said sidewalls having inside concave faces and outside convex faces, said convex faces protruding into the open inner extremities of said cylinders.
2. A steam motor as described in claim 1 having:
a. a plurality of spaced protuberances formed on the concave faces of said sidewalls against which the burning gases from said burner chamber impinge to facilitate heat exchange.