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G. E. OCALIN.

COMBINED HYDRAULIC MOTOR AND AIR COMPRESSOR.

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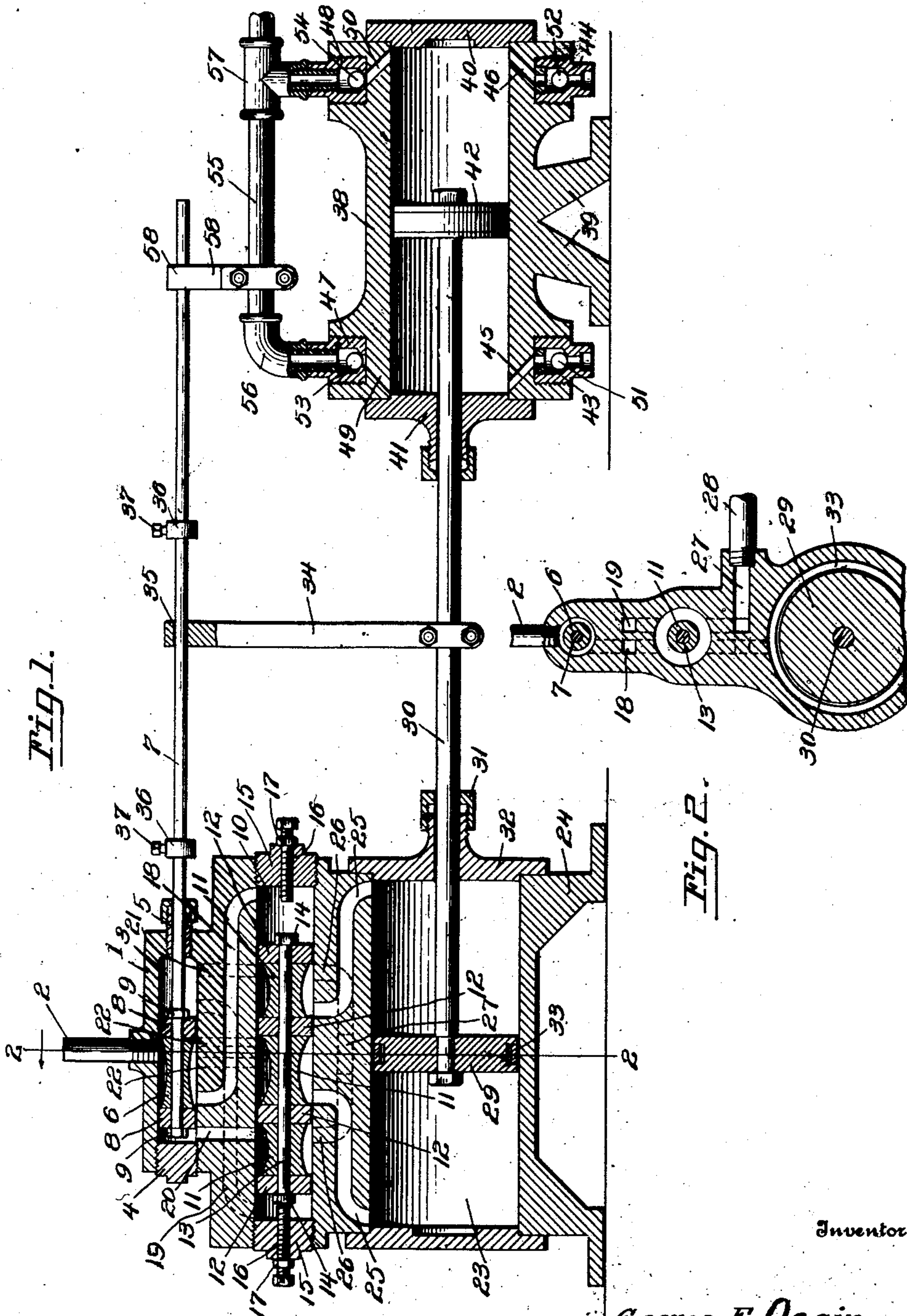


Fig. 1.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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COMBINED HYDRAULIC MOTOR AND AIR-COMPRESSOR.

No. 896,571.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed June 28, 1907. Serial No. 381,318.

To all whom it may concern:

Be it known that I, GEORGE EDWARD OCAIN, a citizen of the United States of America, residing at Oak Park, in the county of Cook and State of Illinois, have invented new and useful Improvements in a Combined Hydraulic Motor and Air-Compressor, of which the following is a specification.

This invention relates to combined hydraulic motors and air compressors, and one of the principal objects of the same is to provide an efficient motor of simple construction to be operated by means of the pressure from the water main of a city water supply system, said motor being connected to an air compressor.

Another object of the invention is to simplify the valve mechanism of hydraulic motors, and to render the same simple in construction and efficient in operation.

Still another object of my invention is to provide a hydraulic motor in which the piston rod is connected to the piston of the air compressor, so that each reciprocation of the motor piston, operates the piston in the air compressor.

These and other objects of the invention may be attained by means of the construction illustrated in the accompanying drawing, in which:

Figure 1 is a vertical longitudinal section through a motor and compressor made in accordance with my invention. Fig. 2 is a vertical section on the line 2—2 of Fig. 1, looking in the direction indicated by the arrows.

Referring to the drawing for a more particular description of my invention, the numeral 1 designates a valve casing in which is fitted a pipe 2 which is connected to the water supply main of a city water supply system. In the valve casing 1 a valve chamber 3 is provided, said valve chamber having a threaded plug 4 in one end thereof, and a suitable stuffing box 5 in the opposite end thereof. A reciprocating valve 6 having a reduced central portion and enlarged ends somewhat in the form of the body of a spool, is mounted in the chamber 3, and connected to a reciprocating valve stem 7 which extends out through the stuffing box 5. At each end of the valve 6 is a head 8 which fits the walls of the chamber 3, said heads being clamped at the ends of the valve 6 by means of suitable lock nuts 9. Below the valve casing 1 is a valve chamber 10 in which is mounted a

sliding valve comprising three spools 11 similar in construction to the spool 6, said valve being provided with disks or heads 12 which are clamped against the valve bodies 11 by means of a rod or stem 13 which passes through the valve bodies 11 through the disks or heads 12 and are provided at the opposite ends with nuts 14 fitted to the rod or stem 13 for clamping the valves thereon. Fitted in the opposite ends of the chamber 10 are threaded plugs 15, and passing through the threaded plugs are set screws 16 provided with lock nuts 17. The set screws 16 are adapted to be adjusted to limit the throw of the valves 11, as will be understood.

A waterway 18 establishes communication between the chamber 3 at one end and the valve chamber 10 at the other end, and as shown in Fig. 2 there is a similar waterway 19, which also communicates with the chamber 3 and the chamber 10 at the opposite ends thereof, said waterway 19 lying parallel to the waterway 18, as shown in Fig. 2. A vertical passage 20 extends from the valve chamber 3 to the valve chamber 10 at one end of the chamber 3, and a similar passage 21 communicates between said two chambers at the opposite end of the valve chamber 3, said two passages being out of longitudinal alinement. Two parallel passageways 22 disposed centrally to the motor establish communication between the valve chamber 3 and the valve chamber 10.

A cylinder 23 to which the valve casing is secured is provided with a base portion 24 which supports the motor, and waterways 25 establish communication between the valve chamber 10 and the interior of the cylinder 23 at opposite ends thereof, while exhaust ports 26 establish communication between the valve chamber 10 and the outlet 27 upon each side of the center of the motor, said outlet 27 having an exhaust pipe 28 connected thereto.

Mounted in the cylinder 23 is a piston 29. The piston 29 is connected to a piston rod 30 passing through a stuffing box 31 fitted to the head 32 of the cylinder 23, said piston having suitable packings 33 thereon. Connected to the piston rod 30 is a standard 34 through which the valve stem 7 freely passes at 35. Connected to the valve stem 7 are adjustable stops 36 provided with set screws 37 by means of which the stops may be shifted upon the stem 7 and adjusted at the required

position, so that the standard 34 in coming in contact with one or the other of said stops will shift the valve 6 in the chamber 3. The air compressor consists of a casing 38 mounted on a base 39 and provided with a head 40 fitted to one end of the casing and a stuffing box 41 fitted to the other end of the casing, the piston rod 30 passing through said stuffing box and provided upon its end with a piston 42.

Fitted in the lower side of the cylinder 38 is a pair of valve seats 43, 44 fitted in threaded openings in the bottom of the cylinder and having openings therein which communicate with the air passages 45, 46. At the upper side of the cylinder 38 similar valve seats 47 and 48 are fitted in threaded openings, said valve seats communicating through the passages 49 and 50 with the opposite ends of the cylinder 38. Seated in the valve seats are balls 51, 52, 53 and 54, and connected to the valve seats 47 and 48 is a pipe 55 connected by an elbow 56 to the valve seat 47 and connected by a T-coupling 57 to the valve seat 48. The pipe 55 leads to a suitable air compressor tank, not shown. A support for the valve stem 7 comprises a bar 58 clamped to the pipe 55 and provided with an opening in the upper end thereof through which the valve stem 7 freely slides.

The operation of my invention may be briefly described as follows: Water under the pressure of the water main being admitted through pipe 2 into the valve chamber 3, will pass down through the passageways 22 to the valve chamber 10, and through the passage 25 to the cylinder 23, thus forcing the piston 29 toward the right, the water at the right of piston 29 being forced up through the passage 25 to the exhaust 27 and 28.

When the standard 34 strikes the stop 36 at the right hand side of the stem 7, the valve 6 is shifted toward the right to cover the upper end of the passage 18 at the left and open the one at the right, the water then flowing through openings 22 into the chamber 10, and through the right hand passage 25 to force the piston 29 to the left. The operation of the piston rod 30 as it moves toward the right lifts the ball 51 from its seat and

permits air to enter through the passage 45 into the cylinder 38. On the back stroke of the piston 42 the air drawn in at the left of the cylinder raises the ball 53 and forces the air through the pipe 52 to the compressed air tank, said back stroke of the piston 42 raising the ball 52 to draw air in at the right hand side of the piston 42, and to expel said air through the passage 50 to raise the ball 54 on the return stroke.

From the foregoing it will be obvious that a machine made in accordance with my invention is comparatively simple in construction; will operate smoothly; is composed of comparatively few parts, and can be constructed at comparatively slight cost.

Having thus described the invention, what I claim is:

In a device of the character described, the combination of a valve casing, a spool-shaped valve mounted to slide therein, a water inlet pipe communicating with said casing, a valve stem connected to said valve, stops on the stem, a cylinder below the valve casing, a piston in said cylinder, a valve chamber above said cylinder, a valve in said chamber, said valve comprising a stem, spool-shaped valve bodies clamped thereon, exhaust passages formed in the valve casings and leading in a direct line from one valve casing to the other, and passages extending longitudinally of the casings and communicating with the interior near the ends thereof, passageways communicating with one of the valve casings and said cylinder, a supply passageway leading from one casing to the other, curved passageways in the last mentioned valve casing, said passageways being connected by a horizontal branch, an air compressor, a piston connected to the piston rod of the motor cylinder, and a standard connected to said rod for actuating the valve stem of the first named valve, substantially as described.

In testimony whereof, I affix my signature in presence of two witnesses.

GEORGE EDWARD OCAIN.

Witnesses:

BERNICE OSWALD,
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