No. 847,945. PATENTED MAR. 19, 1907.

G. W. ILETT.

MEANS FOR CONVERTING MOTION.

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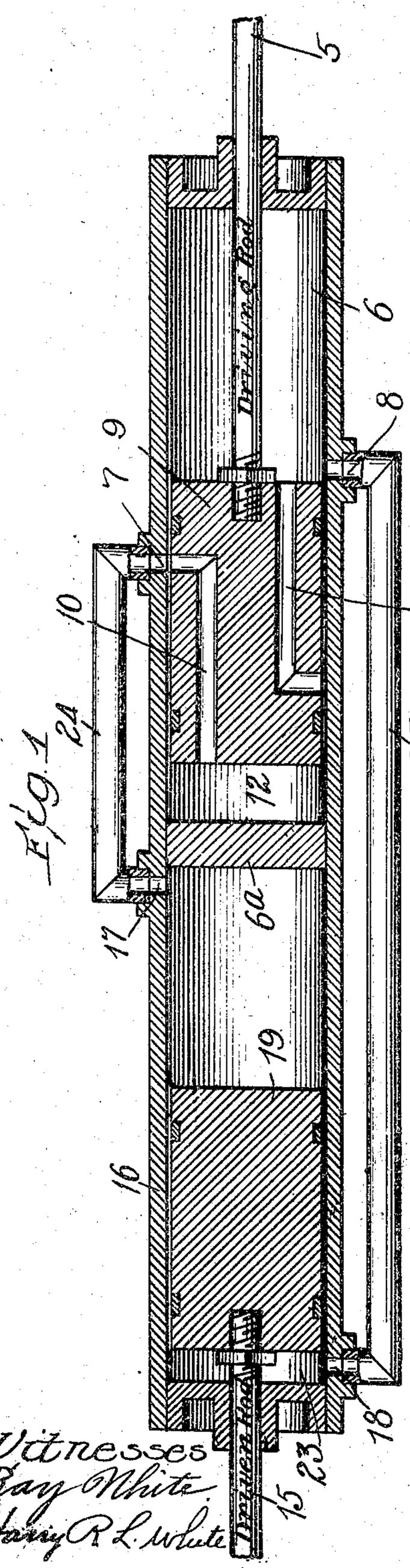


Fig. 1.

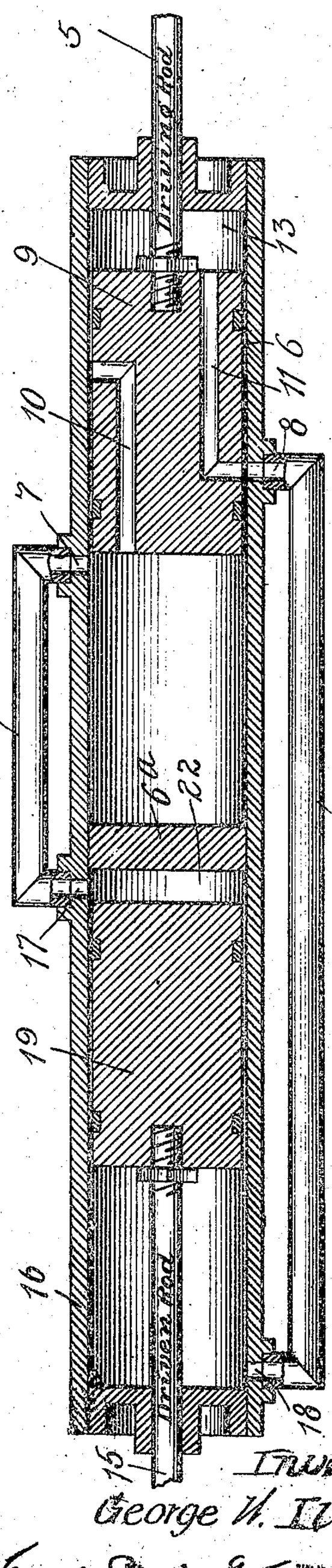


Fig. 2.

Witnesses
Ray White
Harry R. L. White

Inventor.
George W. Ilett

By

Attorneys

# UNITED STATES PATENT OFFICE.

GEORGE W. ILETT, OF CHICAGO, ILLINOIS.

## MEANS FOR CONVERTING MOTION.

No. 847,945. Specification of Letters Patent. Patented March 19, 1907.

Application filed December 26, 1906. Serial No. 293,321.

*To all whom it may concern:*

Be it known that I, GEORGE W. ILETT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Means for Converting Motion, of which the following is a specification.

My invention relates to means for converting motion, and has for its primary object to provide a simple and efficient means for converting a relatively steady reciprocation of one part to quick impulsive strokes of another part.

In the accompanying drawing, Figures 1 and 2 show in like sectional views, in different positions, a means for effecting such conversion of motion, and my invention may most clearly be described in relation thereto.

In the drawing, 5 indicates a reciprocator, shown as a rod, to which steady reciprocating motion is imparted by any suitable engine or power-generator, and from the movements whereof it is desired to transmit to a coacting part rapid impulsive reciprocatory movement.

6 indicates a cylinder of air-tight construction, having therein two ports 7 and 8, suitably disposed for purposes to be hereafter described, and wherein is arranged for reciprocation a piston 9, to which the rod 5 is connected, said piston dividing the cylinder 6 into two fluid-chambers. Through the piston 9 extend two conduits 10 and 11, respectively, located for coöperation with the ports 7 and 8, respectively. The piston length and arrangement of conduit is such that when the piston 9 is at or near the end of its instroke it effects communication between port 7 and the clearance-space 12 between the end of the piston and the inner end of the cylinder, while the piston opens port 8 direct to the outer chamber of the cylinder, as best shown in Fig. 1, and when the piston is at or near the end of its out stroke the conduit 11 effects communication between port 8 and the clearance 13, intervening between the outer cylinder-head and the outer end of the piston, while the piston clears port 7, so that said port communicates directly with the inner chamber. These parts—the cylinder, piston, and piston-moving means—constitute a fluid-pressure-varying unit.

15 indicates the element to which impulsive movements are to be transmitted, said element being preferably a piston-rod extending through the head of a cylinder 16, preferably opposed to the cylinder 6 and provided with ports 17 and 18, respectively, located in the clearance-spaces adjacent the inner and outer ends of the cylinder 16. For convenience the cylinders 16 and 6 may be arranged in axial alinement and made as one integral cylinder, subsequently divided by the interposition of a common cylinder-head $6^a$ between parts 6 and 16, although obviously no particular collocation of the cylinders is essential.

19 indicates a piston connected to the extremity of the rod 15 and preferably made solid throughout. The piston is of such length and stroke as to leave at its inner end a clearance-space 22, wherewith the port 17 communicates, and at its outer extremity a clearance-space 23, wherewith the port 18 communicates. These parts (the cylinder, piston, and element 15) constitute a fluid-pressure-utilizing unit. Connections between the two units are afforded as follows: 24 indicates an open conduit connecting ports 7 and 17, and 25 indicates a conduit connecting ports 8 and 18.

The entire structure thus described should be air-tight for the simplest embodiment of my invention, and air may be the compressible fluid employed therewith. Assuming now that power is applied to the power-transmitting element 5 to reciprocate the same in even steady fashion after the manner of reciprocation transmitted through the ordinary connecting-rod from a smooth-running engine, the relatively slow reciprocation of the piston 9 is converted into quick impulsive strokes of piston 19 equal in number to, but reversed in direction relative to, the in and out strokes of the steadily-moving transmitting element, the operation being as follows:

Assuming the parts to be in the position shown in Fig. 1, with the piston 9 at the end of its instroke, it will be apparent that as the rod 5 and piston 9 move outward the initial movement of the piston closes the ports 7 and 8, so that thereafter air is compressed in the outer chamber of the cylinder 6 by the piston 9 and a vacuum tendency is created in the inner chamber by the piston until the piston reaches the position shown in Fig. 2, where it opens the ports 7 and 8, the former opening into the then vacuum-chamber of the cylinder and the latter into the then pressure-chamber of the cylinder. Now it will be apparent that air rushing from the

cylinder 6 through port 8, the conduit 25, and port 18 to the clearance-space 23 at the outer side of the impulse-piston 19, the air likewise rushing from the inner end of the cylinder 16 through port 17, conduit 24, and port 7 to satisfy the vacuum tendency in the vacuum-chamber end of cylinder 6, said pressure-piston 19 is caused thereby to make a quick impulsive stroke. Now upon reversal of direction of movement of the piston 9 the operation is reversed, ports 7 and 8 being closed and air compressed at the inner end of the cylinder 6, while a vacuum tendency is created at the outer end of said cylinder. Now when the piston 9 reaches the position shown in Fig. 1, (the piston 19 having in the interim remained in the position shown in Fig. 2,) the ports 7 and 8 being respectively open to the pressure and vacuum chambers of the cylinder 6, air is forced under pressure into clearance-space 22 and exhausted from the outer end of the cylinder 16, so that a second impulse movement is imparted to the piston 19 of the pressure-operated unit. At the completion of this impulse motion the parts are again in the position shown in Fig. 1 ready for a repetition of the cycle of operation just described.

While I have not herein shown the application of my invention to any particular use, it will be obvious that its applications are many and varied and, by way of example merely, that the device might be employed for rock-drills, automatic hammers, and the like.

While I have herein described specifically one embodiment of my invention, it will be apparent that changes might be made in its mechanical features without departure from the spirit thereof.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a device of the character described, the combination of a pressure-varying unit comprising a cylinder having compression-spaces, and a plurality of ports, a correspondingly-ported piston therein controlling the communication of the cylinder-ports with the compression-spaces, and means for moving said piston; of a fluid-pressure-utilizing unit, comprising a cylinder having ports, a piston therein, and a part extending to the exterior of the cylinder associated with the piston for movement therewith; and suitable connections for transmitting fluid-pressure, connecting the ports of the cylinders of the two said units.

2. In a device of the character described, a cylinder, a piston therein, means for reciprocating said piston, a second cylinder, a piston therein, and valveless passages for communication between the two said cylinders, controlled directly by the piston in the first said cylinder.

3. In a device of the character described, two cylinders, each having two ports therein, two open connections, each between two ports, which are respectively on opposite cylinders, a piston in one of said cylinders provided with conduits arranged, when said piston is at either end of its stroke to open communication between one port and the portion of the cylinder on one side of the piston and between the other port and the portion of the cylinder on the opposite side of the piston, means for moving said piston; in the other cylinder a piston arranged for reciprocation between the ports of said cylinder, and a working part extending to the exterior of the last said cylinder connected with the piston for movement therewith.

4. In a device of the character described, a cylinder 6 provided with ports 7 and 8, a piston 9 in said cylinder, provided with conduits 10 and 11 opening to opposite ends of the piston, and arranged each to communicate with one of the said ports 7 and 8, one when the piston is at one end of its stroke and the other when the piston is at the other end of its stroke, a piston-rod 5 connected with the piston 9; a cylinder 16 having adjacent its ends ports 17 and 18, a solid piston 19 arranged therein, a piston-rod 15 connected therewith, and connections 24 and 25 establishing communication between the two pairs of ports, whereof the ports of each pair are in opposite cylinders.

In testimony whereof I hereunto set my hand in the presence of two witnesses.

GEORGE W. ILETT.

In presence of—
FORÉE BAIN,
MARY F. ALLEN.