E. KETTERER.

FLUID OPERATED APPARATUS.

APPLICATION FILED JAN. 21, 1910.

959,547.

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Fig. 1

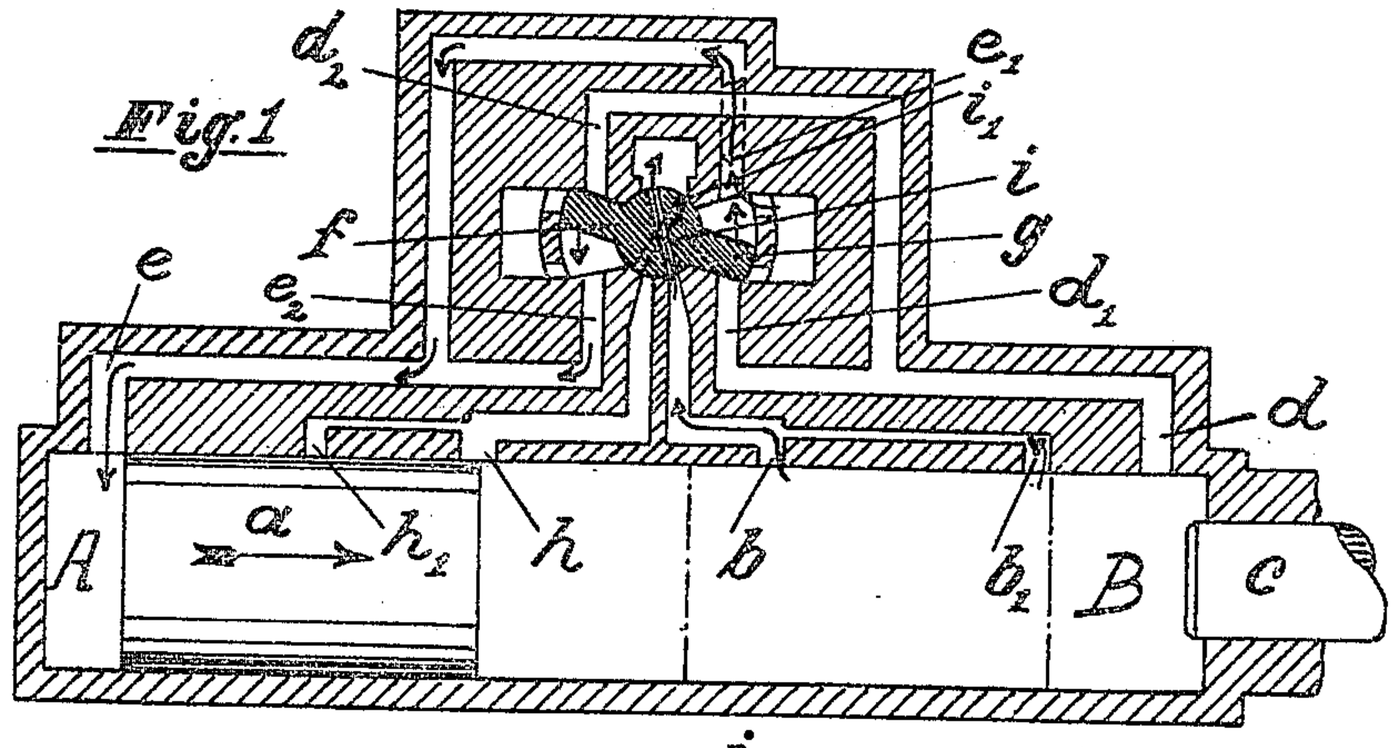


Fig. 2.

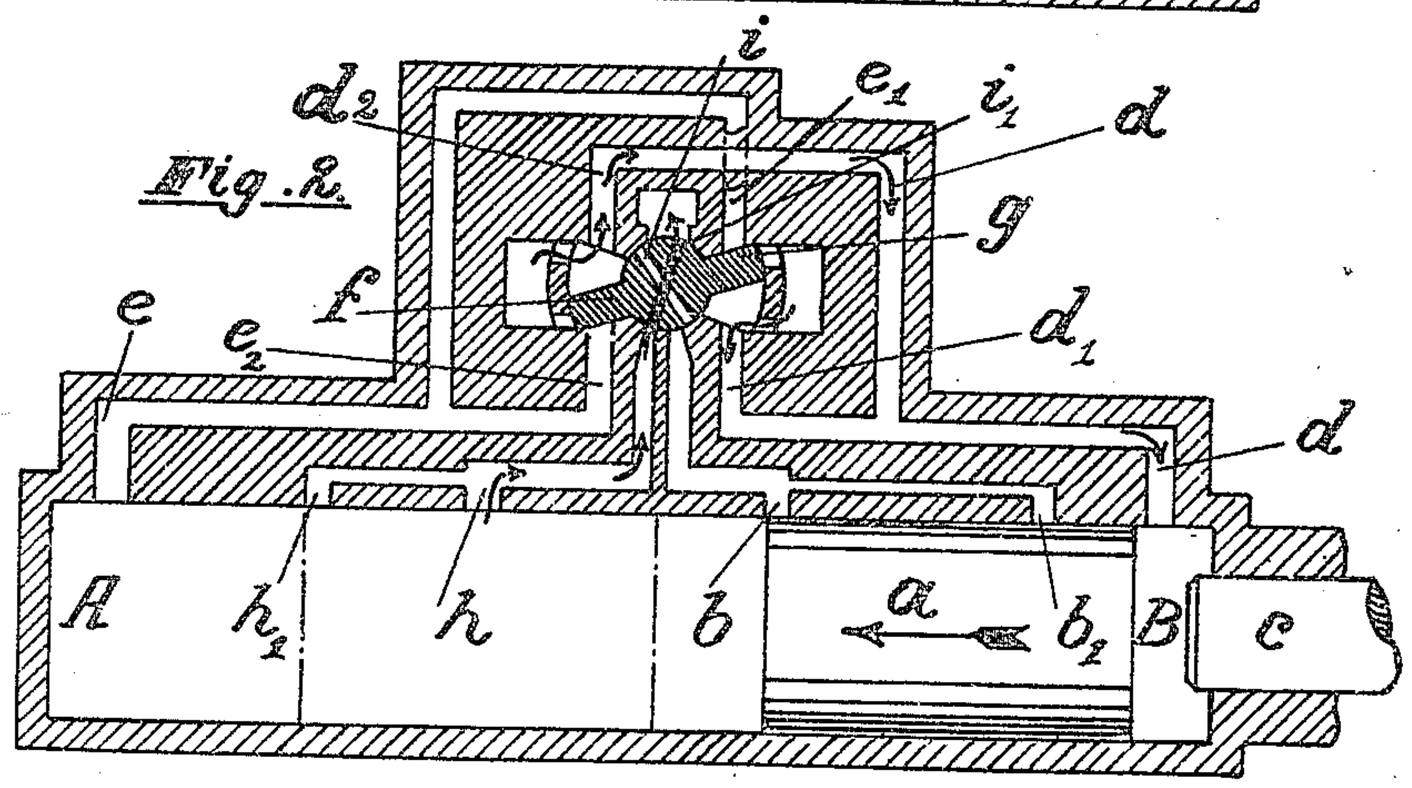
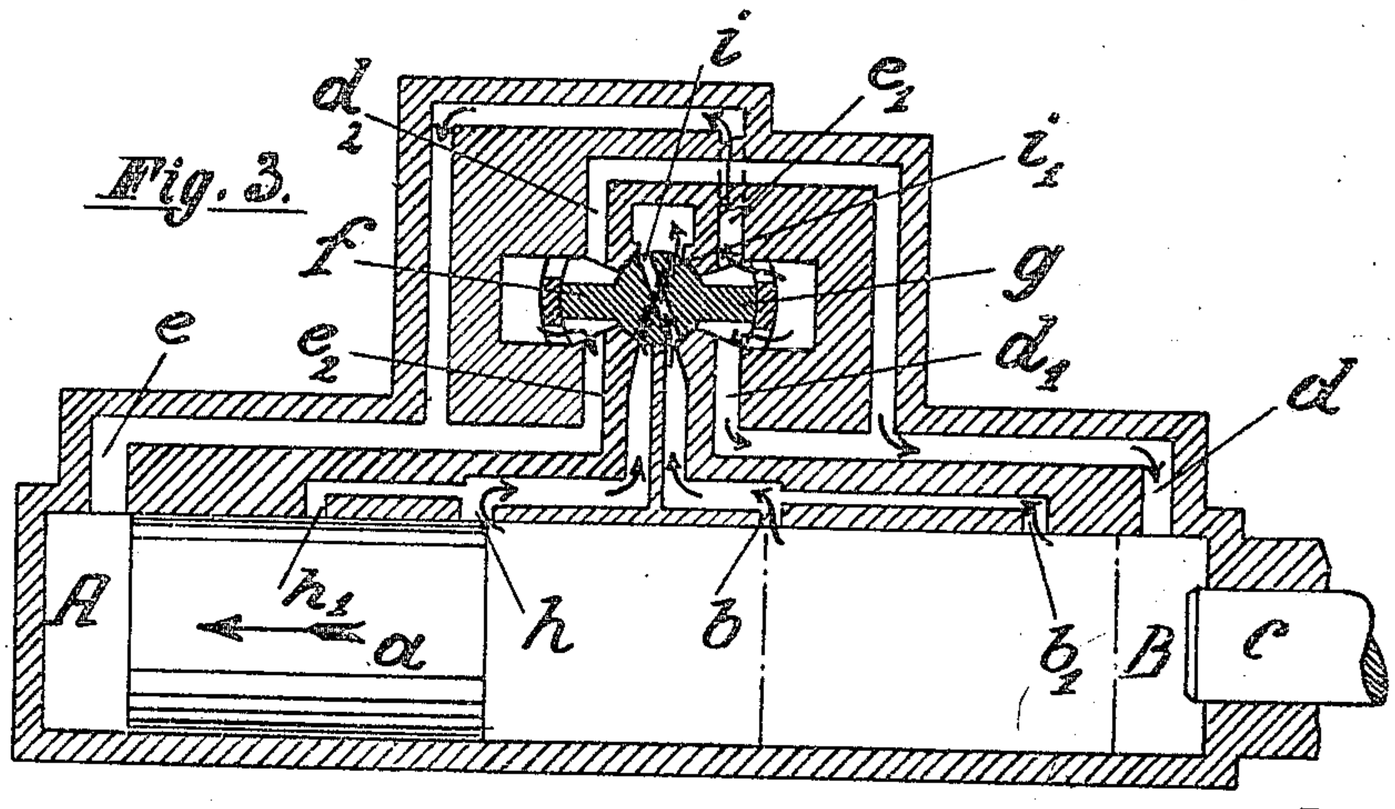


Fig. 3.



Witnesses

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FLUID-OPERATED APPARATUS.

959,547. Specification of Letters Patent. Patented May 31, 1910.

Application filed January 21, 1910. Serial No. 539,343.

To all whom it may concern:

Be it known that I, EUGEN KETTERER, a subject of the Emperor of Germany, residing at Kopstadt Platz 8, Essen-on-the-Ruhr, Germany, have invented new and useful Improvements in Fluid-Operated Apparatus, of which the following is a specification.

This invention relates to fluid operated tools and machines, and more particularly to the valve mechanism by means of which the operation of the device is controlled.

One of the objects of the invention is to obtain a more rapid motion of the valve, thereby obtaining a more exact regulation than has hitherto been obtained.

Other objects will be in part obvious and in part pointed out hereinafter.

In the accompanying drawings showing an illustrative embodment of this invention, and in which the same reference characters refer to similar parts in the several figures; Figure 1 is a sectional view showing the valve in one of its alternate positions. Fig. 2 is a view similar to Fig. 1, showing the valve in its other alternate position. Fig. 3 is a view similar to Fig. 1, showing the valve in its intermediate position.

Referring to the drawings, the valve is shown as consisting of two leaves, f and g, oppositely disposed with respect to an axis, about which the valve oscillates within a suitable valve casing. The leaves f and g project into suitable chambers formed in the casing, which chambers are spaced from one another, and are out of communication with one another. These chambers are adapted to be connected with the source of fluid supply, by means of which the device is operated, in any suitable manner. Associated with the valve casing, preferably integral therewith, as shown, is the working cylinder A B within which the piston a is adapted to reciprocate, which piston at the termination of its downward stroke causes a blow to be struck upon the stock c of the tool which is connected with the cylinder as indicated in the figures.

For the purpose of admitting the operating fluid into the end A of the cylinder, a conduit e is provided, which connects by branch e' to the chamber, within which the leaf is positioned, and by the branch e^2 to the other of the chambers, the ports which control the branches being preferably so arranged that they are positioned on opposite sides of the chambers with which they are associated. In a similar manner the conduit d admits fluid to the end B of the cylinder, and this conduit is provided with branches d^1 and d^2 connecting with the chambers within which the valve leaves g and f, respectively, are positioned. The ports controlling the branches e^1, e^2, d^1, d^2, are so positioned that when the valve is in one of its alternate positions, as shown in Fig. 1 for example, the ports associated with the branches d^1 d^2 will be closed by the leaves g and f of the valve, leaving the ports associated with branches e^1 e^2 open, whereby fluid may pass into said branches, and therefore into the cylinder at end A. When the valve is in its other alternate position, as indicated in Fig. 2, the ports associated with the branches e and e' will be closed, and the ports associated with branches d^1 and d^2 will be open, thereby permitting fluid to flow into the cylinder at end B.

In order to provide for the exhaust of the fluid within the cylinder after it has performed its work, conduits h and b are provided adjacent the ends A and B of the cylinder respectively, and these conduits are preferably provided with branches h' and b' communicating with the cylinder, as shown in the figures. In order to control the passage of the exhaust fluid through these conduits, the valve is provided at its axis with two channels i and i', the former of which, when the valve is in the position shown in Fig. 1 connects conduit b and its branch b' with an outlet in the casing, which preferably is in communication with the atmosphere. When the valve is in the position shown in Fig. 2, communication between conduit b and the atmosphere is cut off, as indicated in said figure, while channel i, provides a communication between conduit h and its branch h' with the atmosphere.

The operation of the device, which should be obvious from the above description, is as follows: Assuming the parts to be in the position shown in Fig. 1, fluid will be admitted as above explained to the end A of the cylinder, thereby causing the piston a to move to the right, as indicated by the arrow. During this movement of the piston, the air in the cylinder will be exhausted through conduits b and b' and channel i in the valve, after which it escapes to the atmosphere. When the piston reaches the position indicated by dotted lines in Fig. 1,

exhaust through the conduits b and b' is prevented, in consequence of which there will be compression at the right hand end B of the cylinder and the fluid, which will be forced through conduit d, and its branches d^1 d^2, will be brought into contact with the opposite surfaces of the valve leaves f and g, thereby forcing the valve to rotate about its axis to assume its alternate position, as shown in Fig. 2. As soon as the valve assumes this position, operating fluid will be admitted to the right hand end B of the cylinder, causing the piston to travel in the opposite direction, as indicated by the arrow in Fig. 2. During the movement of the piston in this direction, the fluid in the cylinder will be expelled through conduits h and h' and channel i, to the atmosphere, until the piston assumes the position indicated in dotted lines in Fig. 2, at which point the exhaust through these conduits is cut off and the fluid is compelled to pass through conduit e and branches e^1 and e^2 into contact with the leaves of the valve, thereby causing the rotation of same, whereby it will assume the position shown in Fig. 1. This movement of the valve again admits the fluid into the end A of the cylinder and the operation is repeated as above described.

Referring to Fig. 3 it is evident that during the reversal of the device when the piston is at the left hand end of the cylinder, exhaust conduits h, b and b' are momentarily connected with the atmosphere inasmuch as when the valve is in its intermediate position the channels i, i' communicate simultaneously with their respective passages. This construction provides for a suitable decrease of pressure in the end B of the cylinder, thereby reducing the pressure upon the end of the piston a which is opposite to the end upon which the operating fluid is acting. In a similar manner during the reversal of the device when the piston is at the right hand end of the cylinder the exhaust conduits b, h, h' will be momentarily in communication with the atmosphere.

It will be seen from the above description that a valve is provided in which the fluid, such as air or steam, which operates the same acts upon opposite surfaces of the leaves simultaneously, thereby effecting rapid movement of the valve.

Having described this invention in connection with the alternate movement thereof, to the details of which disclosure, the invention is not, of course, to be limited, what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

1. In fluid operated apparatus of the class described, in combination, a cylinder, a piston within said cylinder adapted to be reciprocated by the fluid, an oscillating valve for controlling the admission of the fluid to the cylinder, said valve comprising two leaves, and means for causing the fluid from the cylinder to act simultaneously upon one surface of one of said leaves and upon the opposite surface of the other of said leaves to cause said valve to oscillate.

2. In fluid operated apparatus of the class described, in combination, a cylinder, a piston within said cylinder adapted to be reciprocated by the fluid, an oscillating valve for controlling the admission of the fluid to the cylinder, said valve comprising two leaves, means for causing the fluid from the cylinder to act simultaneously upon one surface of one of said leaves and upon the opposite surface of the other of said leaves to cause said valve to oscillate said leaves serving at the same time for controlling the fluid from the source of supply.

3. In fluid operated apparatus of the class described, in combination, a cylinder, a piston therein adapted to be reciprocated by the fluid, an oscillating valve comprising two leaves, a casing within which said valve is supported, said casing comprising two spaced chambers adapted to be connected to the source of supply of the fluid, said valve being so positioned that one of said leaves extends within one of said chambers and the other of said leaves extends within the other of said chambers, each of said chambers being in communication with each end of said cylinder, said valve being so positioned that when it is in one of its alternate positions communication between said chambers and one end of said cylinder is effected, and when the valve is in its other alternate position communication between said chambers and the other end of said cylinder is effected.

4. In fluid operated apparatus of the class described, in combination, a cylinder, a piston therein adapted to be reciprocated by the fluid, a valve casing comprising two spaced chambers adapted to be connected with the source of supply of the fluid, an oscillating valve within said casing for controlling the admission of the fluid to said cylinder, said valve comprising two leaves, one of which extends within one of said chambers and the other of which extends within the other of said chambers, oppositely disposed passages leading from each of said chambers and adapted to be alternately opened and closed as said valve oscillates, one of said passages of one of said chambers and the oppositely disposed passage of the passages of the other of said chambers being in communication with one end of said cylinder and the other of the passages of the first-named chamber and the oppositely disposed passage of the passages of the other chamber being in communication with the other end of said cylinder, said valve being so positioned that in one of its alternate posi-

tions it will close the passages of both chambers leading to one end of said cylinder and open the passages of both chambers leading to the other end of said cylinder and that in the other of its alternate positions it will open the first named passages and close the last named passages.

5. In fluid operated apparatus of the class described, in combination, a cylinder, a piston within said cylinder, adapted to be reciprocated to the fluid, an oscillating valve for controlling the admission of the fluid to the cylinder, said valve comprising two leaves, means for causing the fluid from the cylinder to act simultaneously upon one surface of one of said leaves and upon the opposite surface of the other of said leaves to cause said valve to oscillate, said leaves serving at the same time for controlling the fluid from the source of supply and for controlling the exhaust of the fluid from said cylinder.

6. In fluid operated apparatus of the class described in combination, a cylinder, a piston within said cylinder adapted to be reciprocated by the fluid, an oscillating valve for controlling the admission of the fluid to the cylinder, said valve comprising two leaves, means for causing the fluid from the cylinder to act simultaneously upon one surface of one of said leaves and upon the opposite surface of the other of said leaves to cause said valve to oscillate, said leaves serving at the same time for controlling the fluid from the source of supply, a valve casing provided with an outlet to the atmosphere, an exhaust conduit communicating with one end of said cylinder, and an exhaust conduit communicating with the other end of said cylinder, said valve being provided with two channels, one of which is adapted to connect one of said conduits with the outlet in the casing when the valve is in one of its alternate positions, and the other of which is adapted to connect the other of said conduits with the outlet when the valve is in the other alternate position.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EUGEN KETTERER. [L. S.]

Witnesses:

OTTO KÖNIG,

CHAS. J. WRIGHT.