No. 719,714. PATENTED FEB. 3, 1903.

J. H. ALLEN.

VALVE FOR RECIPROCATING ENGINES.

APPLICATION FILED MAR. 13, 1902.

NO MODEL.

Fig. 1,

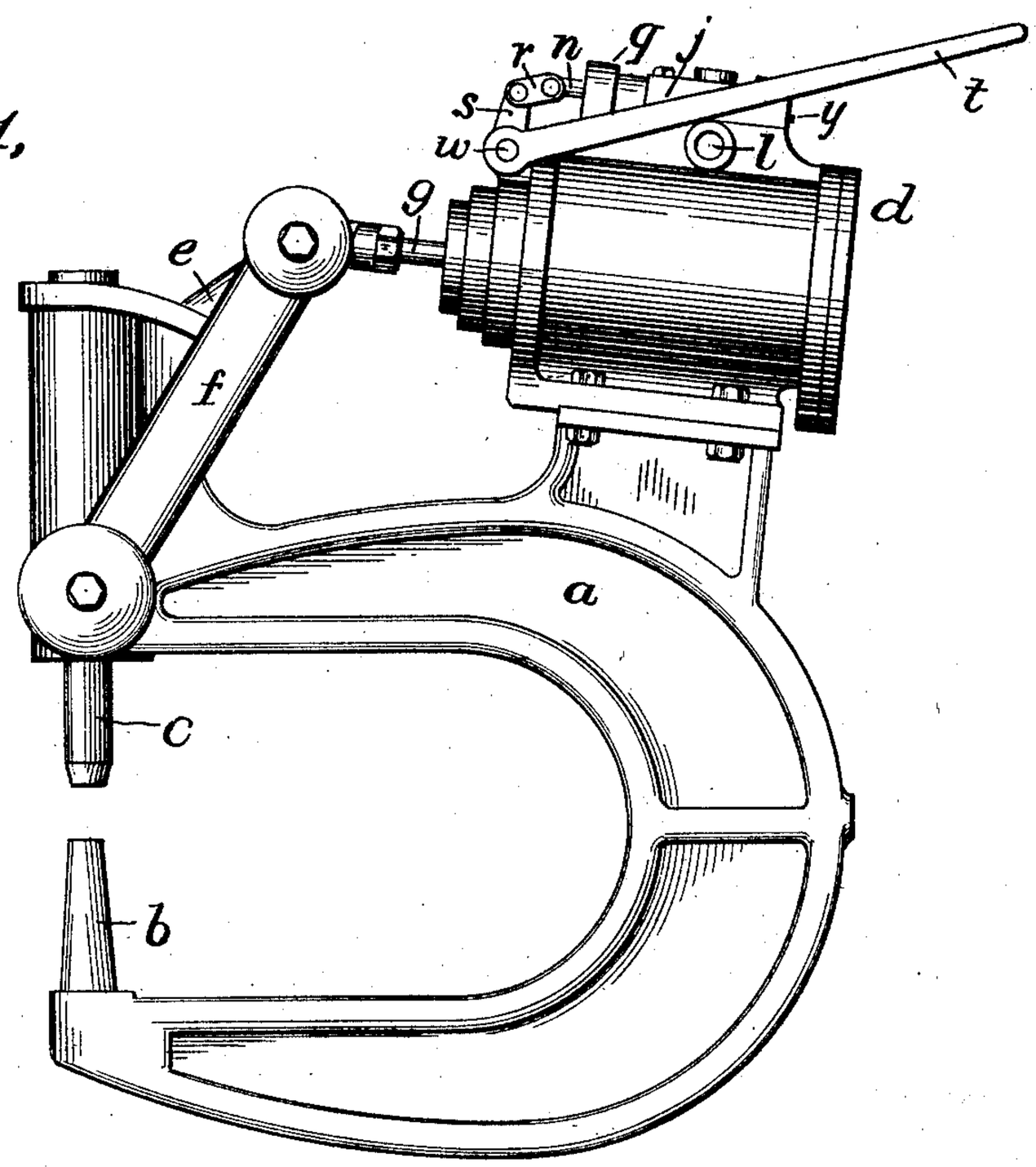


Fig. 2,

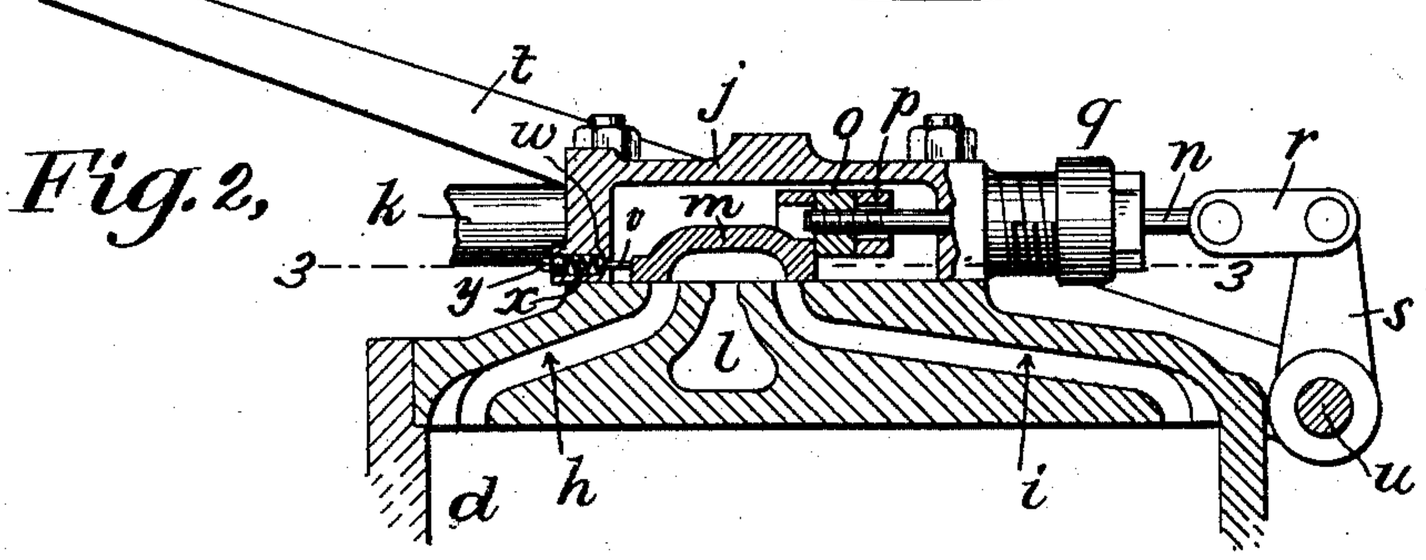
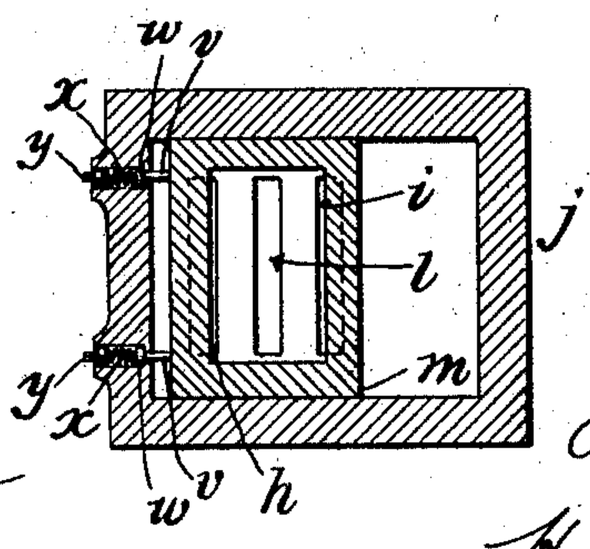


Fig. 3,



WITNESSES:
Herbert H. Gibbs
John A. Barnes

INVENTOR
John H. Allen
BY
Henry B. Williams
ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN H. ALLEN, OF NEW YORK, N. Y.

VALVE FOR RECIPROCATING ENGINES.

SPECIFICATION forming part of Letters Patent No. 719,714, dated February 3, 1903.

Application filed March 13, 1902. Serial No. 98,124. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. ALLEN, a citizen of the United States, residing at the borough of the Bronx, in the city of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Valves for Reciprocating Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to valves for reciprocating engines, and particularly for that type of engines in which a powerful stroke is required in one direction and a light or return stroke in the other direction, such as the operating-engines of riveting-machines of the type known in the trade as "Allen" riveters.

My invention has for its objects facility and readiness of control, certainty of operation, safety, simplicity of construction, and durability.

According to my invention I provide automatic means for returning the controlling-valve to its normal position, so as to produce an inactive condition of the operating-engine, such automatic means being arranged so as to take control of and move the valve to such position upon the release of the operating-lever.

My invention includes various improvements in construction and in the combination of parts.

I will now describe the riveting-machine embodying my invention illustrated in the accompanying drawings, and will thereafter point out my invention in claims.

Figure 1 is a side elevation of the complete riveting-machine. Fig. 2 is a vertical section of the controlling-valve and adjacent parts. Fig. 3 is a detail horizontal section of the valve on the line 3 3, Fig. 2. Figs. 2 and 3 are drawn to a larger scale than Fig. 1, and the machine is shown with the valve-operating lever *t* in front in Fig. 1, while in Fig. 2 the plane of vision is opposite to that of Fig. 1, so that the valve-operating lever *t* is at the back and the parts laterally reversed.

The riveting-machine shown is of the well-known "Allen" type and is only shown in detail so far as it embodies my present invention. It comprises a yoke or frame *a*, having a stationary riveting-head *b* and a movable riveting-head *c*, the cylinder of the operating-engine, and link connections between the movable riveting-head *c* and the piston-rod *g* of the operating-engine. The link connections comprise a compression link member *e* and a pair of tension link members *f*. The movable head *c* and the link connections with the movable head and the piston-rod *g* of the engine may be the same as those shown and described in United States Letters Patent No. 673,631, issued to me on the 7th day of May, 1901. The operating-engine is provided with a piston (not shown) working in the cylinder *d*, as usual. The motive fluid is usually compressed air and is admitted to the valve-chest through the inlet-valve *k* and is exhausted through the port, passage, and outlet *l*. The ports and passage *h* convey the motive fluid from the valve-chest to the cylinder to actuate the piston in the forward or riveting stroke, which is the heavy stroke of the engine, whereby the rivet-head is formed, and the motive fluid admitted through the ports and passage *h* is exhausted through the same ports and passage during the other stroke of the engine. The ports and passage *i* convey motive fluid from the valve-chest to the cylinder to actuate the piston in the return stroke, which is the light stroke of the engine, wherein the only work accomplished is the return of the parts to the normal position, and the motive-fluid admitted through the ports and passages *i* is exhausted through the same ports and passage during the other stroke of the engine. The admission and exhaust of the motive fluid are controlled by the valve *m*, which is shown as of the D-valve type and reciprocates within the valve-chest *j* and is actuated by the valve-rod *n*, adjustably connected to the valve by a nut *o*, threaded on the valve-rod *n* and set into a suitable opening in the hollow projection *p* of the valve, so as to have no rotative or longitudinal movement therein. The valve-rod *n* extends outward through a stuffing-box *q* and is connected by a link *r* with a short arm *s* on the shaft *u* of the pivoted operating-lever *t*. The controlling-valve *m* is shown in its intermediate position, in which the ports to both ends of the cylinder *d* are cut off from the valve-chest and the supply of motive fluid therein and are open to the exhaust-passage *l*. This is the normal position with the riv-

eting-machine out of action and is the position to which it is desirable to return at the completion of the return movement of the piston after each riveting operation. The extreme positions of the valve are the riveting-stroke position, with the operating-lever *t* moved to its extreme upper position, whereby the valve is moved to the right in Figs. 2 and 3 and the left in Fig. 1 until the projection *p* comes in contact with the front end wall of the valve-chest *j*, thereby completely uncovering the port from the valve-chest to the passage *h* and permitting the desired large quantity of motive fluid for this heavy stroke of the piston to enter the cylinder *d*, and the return-stroke position, with the operating-lever *t* moved to its extreme lower position, whereby the valve is moved to the left in Figs. 2 and 3 and the right in Fig. 1 until the valve comes in contact with the rear end wall of the valve-chest *j*, thereby slightly uncovering the port from the valve-chest *j* to the passage *i* and permitting the desired small quantity of motive fluid for the light return stroke to enter the cylinder *d*. It will be noted that in each of these two positions the passage to the cylinder receiving motive fluid is shut off from the exhaust and the other passage opened to the exhaust.

I provide means for automatically returning the controlling-valve to its normal position after the return movement of the engine and holding it in such normal position, and in the construction shown such means comprise spring plungers or pins *v*, of which two are shown, adapted to bear against the rear end of the controlling-valve *m* when the valve reaches its intermediate or normal position shown and having a limited yielding and resilient movement, so as to permit the valve to be moved to its extreme rearward position for the return stroke of the engine, and thereafter by their resilient action to return the valve to normal position upon the release of the operating-lever. These spring-pins *v* are shown as set into perforations or sockets formed in the walls of the valve-chest *j*, and each pin has a head *w*, which comes against the end of the socket and determines the extreme forward position of the spring-pin, and the resilient means comprise springs *x*, working between the headed ends *w* of the spring-pins and the screw-plugs *y*, set into the outer ends of the sockets and adjustable to vary the tension of the spring *x*. The springs are adjusted so as to exert a sufficiently-powerful resilient action to return the valve to normal position and hold it in such normal position until the operating-lever is actuated, and it will be noted that the weight of the operating-lever tends to hold the valve against the spring-pins *v*.

In the operation of the engine the workman first moves the operating-lever to its extreme upward position, thereby putting on the full power for the heavy stroke. In this movement the valve moves away from the spring-pins *v*. At the completion of the heavy stroke after the rivet-head has been properly formed he swings the operating-lever downward to its extreme lower position, and in the latter part of this movement the spring-pins *v* are actuated and their springs compressed. This puts on the light power for the return stroke. At the completion of the return stroke it is only necessary for him to release the lever, and thereupon the spring-pins return the controlling-valve to its normal position shown, and the riveting-machine is out of action and will reliably remain out of action until the workman again forcibly actuates the operating-lever.

It is evident that modifications may be made in the construction shown and above particularly described within the spirit and scope of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of a reciprocating engine and means operated thereby with a heavy stroke of the engine in one direction and a light stroke of the engine in the other direction, a controlling-valve constructed so as to be pressed against its seat by the fluid-pressure, the engine having ports and passages coöperating with the controlling-valve for the admission and exhaust of motive fluid to and from the engine, means for controlling the valve with a large movement in one direction for the heavy stroke and with a smaller movement in the opposite direction for the light stroke, and resilient means for automatically returning the valve from the extreme light-stroke open position to closed position.

2. The combination of a reciprocating engine and means operated thereby with a heavy stroke of the engine in one direction and a light stroke of the engine in the other direction, a controlling-valve, the engine having ports and passages coöperating with the controlling-valve for the admission and exhaust of motive fluid to and from the engine, an operating-lever connected to the valve to actuate the valve in one direction for the heavy stroke and in the opposite direction for the light stroke, and one or more plungers having a limited resilient yielding movement and controlling the valve so as to yield and permit the movement of the valve for the light stroke of the engine and by their resilient action to return the valve to intermediate position for the inactive condition of the engine when the operating-lever is released.

3. The combination of a reciprocating engine and means operated thereby, a reciprocating controlling-valve, the engine having ports and passages coöperating with the controlling-valve for the admission and exhaust of motive fluid to and from the engine, an operating-lever connected to the valve to reciprocate the same, and one or more spring-plungers arranged to contact with the valve in its movement from intermediate position for the inactive condition of the engine to ex-

treme position for one stroke thereof, and to return the valve by their resilient action from the last-mentioned to the first-mentioned position.

4. The combination of a reciprocating engine and means operated thereby, the reciprocating controlling-valve *m*, the engine having ports and passages *h*, *i*, leading to the ends of the cylinder and having exhaust port and passage *l*, the valve-rod *n*, adjustably connected to the valve, an operating-lever connected to the valve-rod, the headed plungers *v w* and springs *x* and adjustable plugs *y* in the wall of the valve-chest, the plungers *v w* being arranged to contact with the valve and return the same from one extreme position to the intermediate position for the inactive condition of the engine, substantially as set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN H. ALLEN.

Witnesses:

HERBERT H. GIBBS,

JOHN H. BARNES.