(No Model.)

L. W. BRYAN.

VALVE GEAR.

No. 346,190. Patented July 27, 1886.

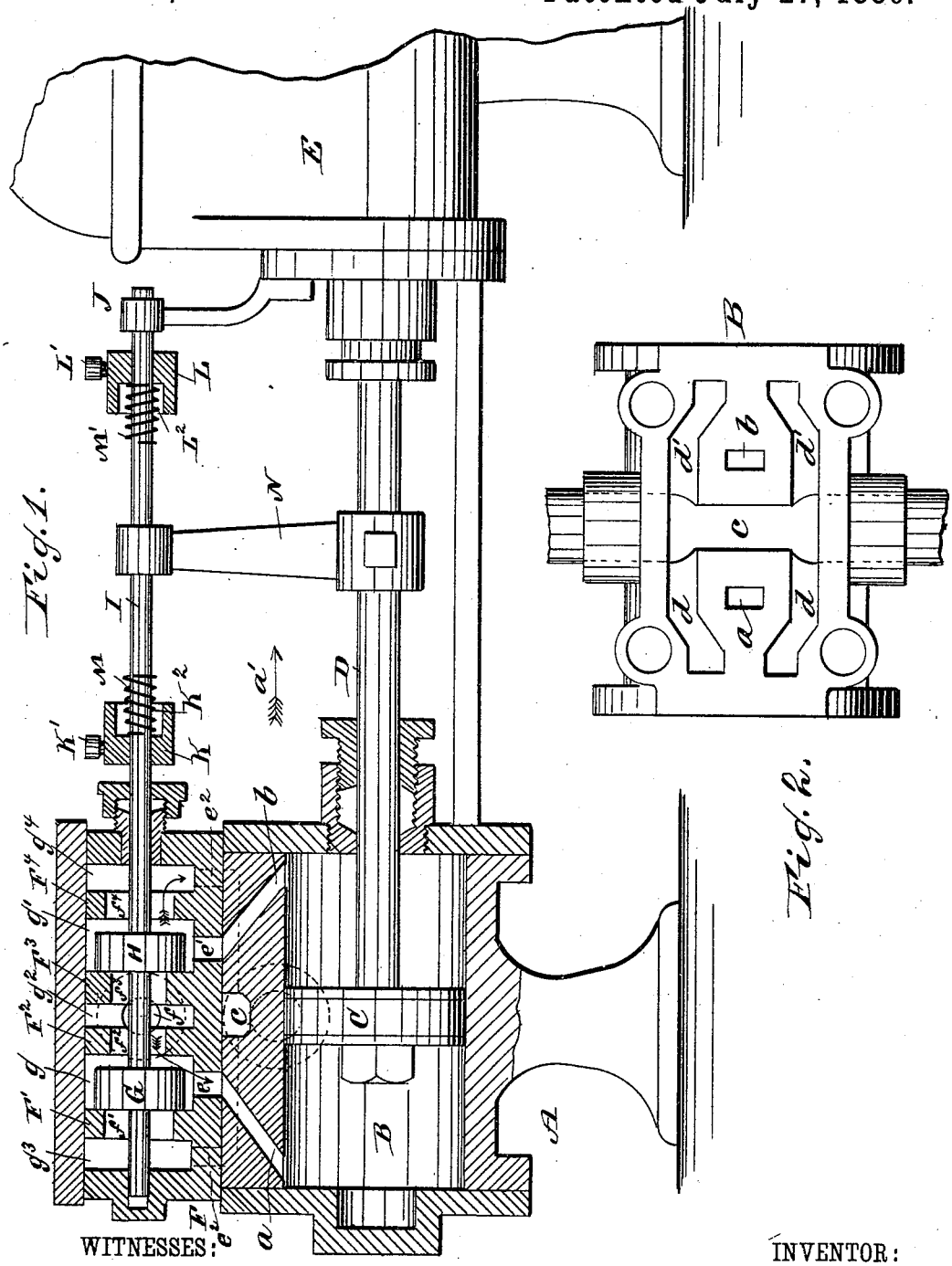

Fig. 1.

Fig. 2.

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VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 346,190, dated July 27, 1886.

Application filed February 6, 1886. Serial No. 191,098. (No model.)

To all whom it may concern:

Be it known that I, LOUIS WILSON BRYAN, of Quincy, in the county of Adams and State of Illinois, have invented a new and useful Improvement in Valve-Gears for Steam-Pumps, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved valve-gear for steam-pumps in which the valves are relieved of all pressure as soon as they leave their respective seats.

The invention consists in various parts and details, and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in both the figures.

Figure 1 is a sectional side elevation of a steam-pump provided with my improvements. Fig. 2 is a plan view of the cylinder, the steam-chest being removed.

The steam-pump A is provided with a cylinder, B, in which is placed a piston, C, attached to the piston-rod D, which operates the plunger and valves in the pump E. The steam-cylinder B is provided with the inlet-ports *a* and *b*, and the central port, *c*, having the additional side passages, *d d* and *d' d'*. The steam-chest F, placed on top of the cylinder B, is provided with four partitions, F', F², F³, and F⁴, each having a central aperture, *f'*, *f²*, *f³*, and *f⁴*. The partitions F', F², F³, and F⁴ form spaces *g*, *g'*, *g²*, *g³*, and *g⁴*, of which the space *g* connects with the steam-port *a* by means of the port *e*. The space *g'* connects by means of the port *e'* with the steam-port *b*, and the spaces *g³* and *g⁴* connect by means of the ports *e²* with the side passages, *d d'*, formed in the cylinder. The steam-chest is also provided with the steam-inlet *f*, which opens into the space *g²* formed between the partitions F² and F³. The collar-valves G and H are placed in the spaces *g* and *g'* between the partitions F' and F² and the partitions F³ and F⁴, respectively, and are mounted on a valve-rod, I, which has its bearing partly in the steam-chest F and partly in a bracket, J, attached to the pump E. A collar, K, is attached to the valve-rod I by means of the set-screw K', and is provided with a recess, K², in which is placed a spring, M, extending a short distance beyond the collar K on the valve-rod I. A similar collar, L, is attached to the valve-rod I by means of a set-screw, L', and provided with a recess, L², in which is placed a similar spring, M'. An arm, N, is attached to the piston-rod D, and its upper end slides loosely on the valve-rod I.

The operation is as follows: In the position shown in Fig. 1, the collar-valves G and H rest against the partitions F' and F³, and when the steam enters through the steam-inlet *f* it passes into the space *g²* and through the aperture *f²* into the space *g*, where it holds the collar-valve G firmly seated against the partition F', as the area of the collar-valve G presented to the steam is greater than the area that the collar-valve H exposes to the steam; and from the space *g* the steam passes through the steam-ports *e* and *a* into the cylinder B, thereby forcing the piston C in the direction of the arrow *a'*, until the arm N strikes the spring M' and compresses the same into the recess L². As soon as the arm N strikes the collar L, the valves G and H are unseated, and forced to the opposite partitions by the action of the compressed spring M' on the collar L. The arm N only touches the collar L sufficiently to unseat the valves G and H slightly, as the compressed spring M' completes the stroke of the valve, thereby closing the aperture *f²* by the collar G, and establishing communication between the aperture *f³*, the space *g'*, and the steam-ports *e'* and *b*.

In the position shown in Fig. 1, the steam exhausts by means of the ports *b* and *e*, the space *g'*, the aperture *f⁴*, and the space *g⁴* in the steam-chest to the side passages *d'*, leading to the exhaust *c*. On the return-stroke of the piston C in the cylinder B, the arm N first compresses the spring M, and then moves the collar K sufficiently to unseat the valves G and H from the partitions F² and F⁴, respectively, and the spring M completes the stroke until the valves G and H are again seated on the partitions F' and F³. The exhaust in this return-stroke takes place through the ports *a* and *e* into space *g*, through the aperture *f'*, into the space *g²* in the steam-chest F, and down

into the side passages, *d*, leading to the central exhaust, *c*, and out at one side of the steam-cylinder. It will be seen that the valves G and H are relieved of all pressure the moment they leave their seats, thereby balancing the valves, so that only a slight spring is required to complete their stroke from one partition to the other after being started by the arm N striking either collar K or L. It will also be understood that one valve exposes a greater area to the live steam than the other as long as they are seated—that is to say, the live steam will hold the valves G and H seated until moved by the arm N.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a valve-gear for steam-pumps, the combination of the cylinder B, having ports *a*, *b*, and *c*, with a steam-chest, F, provided with partitions F′, F², F³, and F⁴, the steam-inlet *f*, and the collar-valves G and H, attached to the valve-rod I, substantially as herein shown and described.

2. In a valve-gear for steam-pumps, the cylinder B, having the ports *a*, *b*, and *c*, the steam-chest F, having partitions F′, F², F³, and F⁴, and the steam-inlet *f*, and the collar-valves G and H, attached to the valve-rod I, in combination with the piston C, the piston-rod D, the arm N, the upper part of which slides loosely on the valve-rod I, the springs M and M′, and the recessed collars K and L, substantially as herein shown and described.

3. In a valve-gear for steam-pumps, the cylinder B, having the steam-ports *a*, *b*, and *c*, and the side passages, *d d* and *d′ d′*, in combination with a steam-chest, F, provided with the partitions F′, F², F³, and F⁴, having apertures *f′*, *f²*, *f³*, and *f⁴*, respectively, and the steam-inlet *f*, substantially as herein shown and described.

4. In a valve-gear for steam-pumps, the steam-chest F, provided with the partitions F′, F², F³, and F⁴, having central apertures, *f′*, *f²*, *f³*, and *f⁴*, respectively, in combination with the collar-valves G and H, attached to the valve-rod I, provided with the recessed collars K and L and the springs M M′, and the arm N, substantially as herein shown and described.

5. In a valve-gear for steam-pumps, the steam-chest F, provided with the partitions F′, F², F³, and F⁴, having central apertures, *f′*, *f²*, *f³*, and *f⁴*, and the collar-valves G and H, attached to a valve-rod, I, in combination with the arm N, the upper end of which slides loosely on the valve-rod I, the springs M and M′, placed in recesses in the collars K and L, which are adjustable on the valve-rod I by means of the set-screws K′ and L′, substantially as herein shown and described.

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Witnesses:
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