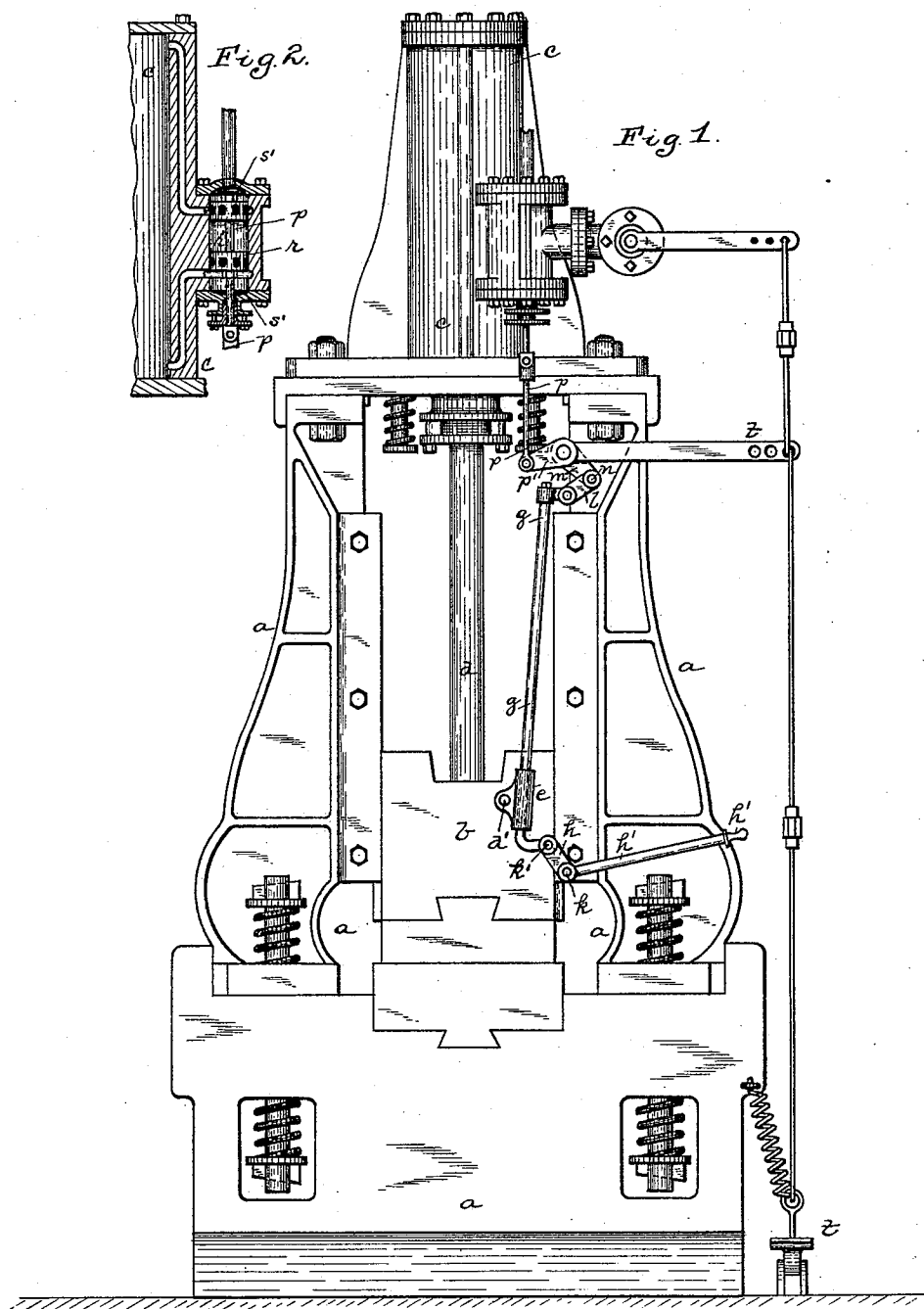


(No Model.)

S. TRETHERWEY.
VALVE GEAR FOR STEAM HAMMERS.

No. 470,723.

Patented Mar. 15, 1892.



Witnesses:

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SAMUEL TRETHEWEY, OF PITTSBURG, PENNSYLVANIA.

VALVE-GEAR FOR STEAM-HAMMERS.

SPECIFICATION forming part of Letters Patent No. 470,723, dated March 15, 1892.

Application filed June 16, 1891. Serial No. 396,468. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL TRETHEWEY, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Valve-Gears for Steam-Hammers; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to valve mechanism for steam-hammers, its object being to provide automatic valve mechanism by which the movement of the ram may be controlled, so that while the length of stroke of the ram and the rapidity of its stroke may be varied, as desired, at the same time the valve controlling the supply and exhaust of steam to the cylinder is given its full stroke, so that even though the length and rapidity of stroke of the ram is varied, yet practically the full strength of the blow thereof is obtained. In the steam-hammers heretofore constructed, though the automatic valve mechanism has been so constructed as to vary the length and rapidity of stroke yet this was accomplished at the loss of power, as when a rapid and short stroke was employed the valve was not moved for its full stroke, and consequently the strength of blow was reduced when its speed was increased. By my invention this difficulty is overcome.

My invention consists, generally stated, in combining with the ram a sleeve or bearing pivoted thereto and a slide-bar on which said block reciprocates, the lower end of said slide-bar being mounted on a crank-arm or cam and its upper end free and being connected to the valve mechanism, so that by varying the position of the lower end of the slide-bar—that is, drawing it toward or from the ram—the movement of the upper or free end thereof will be correspondingly varied, according to the movement of the block sliding thereon, and the valve mechanism connected to the upper end of said slide will be given its stroke by a longer or shorter movement of the bearing moving on its slide-bar, the length of stroke being thus controlled by the angle at which the slide-bar is held and through the valve mechanism, the full stroke being imparted to the valve by a longer or shorter movement of the bearing on the slide-bar.

The particular points comprising my in-

vention will be hereinafter more particularly described and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a face view of part of a steam-hammer illustrating my invention, and Fig. 2 is a longitudinal section showing the valve mechanism and its parts.

Like letters of reference indicate like parts in each.

The steam-hammer has the ordinary frame or body *a*, in which the ram *b* is mounted and reciprocates above the anvil, and the steam-cylinder *c* at the upper end of the frame, the piston-rod *d* thereof being connected to the ram. Secured to the ram-body *b* by the pivoted joint *d'* is the sliding bearing or sleeve *e*, this bearing sliding on the slide-bar *g*. The slide-bar *g* is mounted on the crank-arm *h*, which is journaled on the pin or stud *k* on the frame or body *a* and is operated by a hand-lever *h'*, secured to said crank. Any suitable form of crank or cam mechanism for changing the position of the lower end of the slide-bar *g* may be employed, that shown being a simple and efficient form for the purpose. It will thus be seen that the slide-bar is supported by the crank *h* and by the sliding bearing *e* and that as the crank *h* is turned the lower end of the slide-bar is forced toward or from the ram, so changing its angle of inclination or drawing it parallel with the ram, as may be desired. As, however, the bearing *e* fits on the slide-bar, the point at which said bearing rests on the slide-bar is always at the same distance from the ram, and consequently if the slide-bar is held at a greater or less incline the movement of the upper or free end necessary to move the valve is obtained by a less or greater stroke or movement of the ram. Connected to the upper end of the slide-bar is the link or strap *l*, which in its turn is connected to the crank-lever *m*, mounted on a shaft *n*, journaled on the frame or body *a*, the opposite end of said lever being connected by the strap *p'* to the valve-spindle *p*, which is connected to the valve *r* within the chamber *r'*, the valve *r* being the ordinary or any improved form of slide-valve and controlling the ports to the

steam-cylinder, and steam being admitted to the valve and exhausted therefrom through suitable pipes *s s'*. As so constructed the normal position of the slide-bar *g* when the hammer is being operated automatically is at an incline to the ram in such position that as the bearing *e* reciprocates thereon the slide-bar, being pivoted on the crank *h*, will be drawn toward or from the ram by the movement of the slide-block thereon, the upper or free end of the slide-bar being thus moved to the proper distance for imparting the full stroke to the valve-spindle and the valve to which it is connected, so that as the sliding bearing descends on the slide-bar it will force the free end of the same away from the ram and, through the strap *l* and lever *m*, draw down the valve-spindle, this continuing until the full stroke is given to the valve, when steam will be admitted to the lower end of the steam-cylinder, the movement of the ram being thus reversed and the ram raised thereby. As the sliding bearing rises on the slide-bar it will draw the upper or free end of the same toward the ram, so through the strap *l* and lever *m* raising the valve, and as soon as the valve has it full stroke steam will be admitted to the upper end of the cylinder and the ram reversed, the sliding bearing on the slide-bar thus imparting the necessary movement to the valve and imparting the full stroke thereto, so that practically the full body of steam is admitted in either side of the piston and practically the full strength of the stroke of the ram obtained.

In order now to change the stroke of the ram such as to decrease the length of stroke and increase the rapidity of stroke, the pivotal part *k'* at the lower end of the slide-bar is forced by the lever *h'* toward the ram, so as to impart a greater incline to the slide-bar, in which case, as the sliding bearing moves on the slide-bar, it will require a shorter stroke thereof to impart the necessary full stroke to the valve, and it is evident that by so imparting a greater incline to the slide-bar, as it requires a shorter movement of the bearing on the slide-bar to operate the valve, the length of stroke of the ram is decreased and the rapidity of stroke of the ram correspondingly increased. At the same time practically the same strength of blow will be obtained, as the full movement is given to the valve and practically as full a body of steam admitted on either side of the piston. In the same manner the length of stroke may be increased and the rapidity of stroke decreased, and by drawing the slide-bar paral-

lel with the ram all movement of the slide-bar by the ram will be overcome, the sliding bearing simply reciprocating on the slide-bar without imparting any motion thereto, in which case the movement of the valve and the stroke of the hammer can be controlled in the ordinary way by the hand-lever or treadle *t*, the apparatus thus providing for the automatic operation of the ram at any desired length of stroke and rapidity of stroke and for the operation of the ram by hand, as is sometimes desirable.

The apparatus is simple in construction, and, as has been proven by practical use, is effective in operation, and when the hammer is employed with but a short stroke a very much heavier blow can be struck thereby than with the valve apparatus heretofore employed.

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

1. In valve-apparatus for steam-hammers, the combination of a slide-bar pivoted at its lower end, lever connections from its upper or free end to the valve-spindle, and a sliding bearing pivoted to the ram and reciprocating on the slide-bar, substantially as and for the purposes set forth.

2. In valve apparatus for steam-hammers, the combination of a slide-bar pivoted at the base on a crank, lever connections from the upper or free end thereof to the valve apparatus, and a sliding bearing pivoted to the ram and reciprocating on the slide-bar, substantially as and for the purposes set forth.

3. In valve apparatus for steam-hammers, the combination of a slide-bar pivoted at the base to a transversely-movable bearing, lever connections from the upper or free end thereof to the valve apparatus, and a slide-bearing pivoted on the ram and reciprocating on the slide-bar, substantially as and for the purposes set forth.

4. In valve apparatus for steam-hammers, the combination of the crank-shaft *h*, the slide-bar *g*, pivoted at its lower end thereon, lever connections *l m* from the upper or free end of said slide-bar to the valve-spindle *p*, the ram *b*, and the sliding bearing *e*, pivoted to said ram and reciprocating on said slide-bar, substantially as and for the purposes set forth.

In testimony whereof I, the said SAMUEL TRETHEWEY, have hereunto set my hand.

SAMUEL TRETHEWEY.

Witnesses:

J. N. COOKE,
ROBT. D. TOTTEN.