

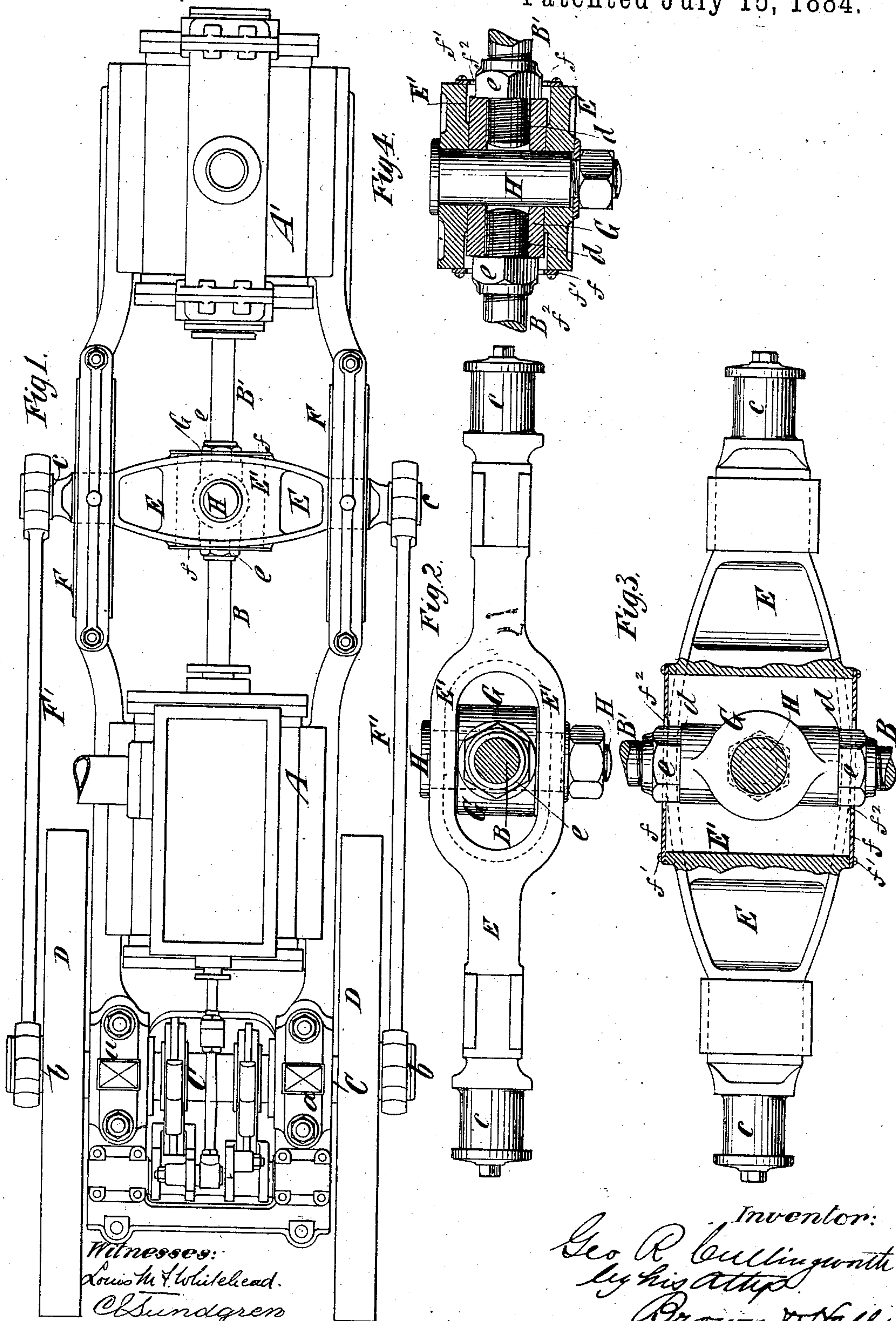
(No Model.)

G. R. CULLINGWORTH.

CROSS HEAD AND PISTON ROD CONNECTION FOR ENGINES.

No. 301,966.

Patented July 15, 1884.



Witnesses:  
Louis M. Whitehead.  
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# UNITED STATES PATENT OFFICE.

GEORGE R. CULLINGWORTH, OF NEW YORK, N. Y.

## CROSS-HEAD AND PISTON-ROD CONNECTION FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 301,966, dated July 15, 1884.

Application filed March 21, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE R. CULLINGWORTH, of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Cross-Head and Piston-Rod Connections for Engines, of which the following is a specification.

My invention is applicable to those engines in which there are outside connecting-rods, which are fitted to wrists at the two ends of the cross-head, and which are liable to vary in length by reason of imperfect construction or unequal wear and tightening of the brasses in the two rods; and the invention relates to those engines in which the piston-rod and cross-head are pivotally connected, so that the piston or pistons will work easily and without excessive wear, whether the cross-head is at right angles to the alignment of the cylinders or by reason of an unequal length in the connecting-rods is canted out of such position.

The invention consists in a novel construction of the pivotal connection between the cross-head and piston-rod, as hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings, Figure 1 represents a plan of such parts of an air-compressing engine as are necessary to illustrate my invention. Fig. 2 illustrates a transverse section of the piston-rod and a side view of the cross-head on a larger scale. Fig. 3 is a partly sectional plan of the cross-head on the same scale as Fig. 2; and Fig. 4 is a transverse section of the cross-head and swivel-block in a plane lengthwise of the piston-rod, and also on the same scale as Figs. 2 and 3.

Similar letters of reference designate corresponding parts in all the figures.

A designates the steam-cylinder, and A' designates the compressing or pump cylinder, which are arranged in line, and the pistons of which are connected by a piston-rod consisting of two sections, B B'. At the back end of the steam or actuating cylinder A is the crank-shaft C, adapted to rotate in suitable bearings, *a*, and having at its ends fly-wheels D, in which are crank-pins *b*. On the crank-shaft C are the eccentrics for operating the valve or valves of the steam-cylinder. The steam-cylinder may be provided with main and cut-off slide-valves, or any other well-known system

of valves; but, as such valves and mechanism for operating them form no part of my present invention, further description of these parts is not necessary.

E designates the cross-head, with which the piston-rod sections B B' are connected, and which is capable of reciprocating in suitable guides, F. At the ends of the cross-head E are wrists *c*, from which two outside connecting-rods, F', extend to the crank-pins *b*.

The construction of the cross-head E and the manner of connecting the piston-rod sections B B' therewith are best shown in Figs. 2, 3, and 4. I provide a swivel-block, G, in opposite sides or ends of which are sockets *d*, into which the sections B B' are screwed, and in which they are secured against turning by jam-nuts *e*, as best shown in Fig. 4. The two rod-sections B B' may, however, be pinned or otherwise secured in the said sockets.

The cross-head E is constructed with a yoke, E', at the middle of its length, thus forming an opening which is large enough to receive the swivel-block G, and to allow the latter to swing or move freely, and the sole connection between said swivel-block and cross-head, and therefore between the piston-rod and cross-head, is formed by a pin or bolt, H, which is inserted through the cross-head, and on which the swivel-block G may turn freely. The sockets *d* are formed by a hole bored through the swivel-block from end to end, and sufficient space is left between the adjacent ends of rod-sections B B' for the passage of the bolt or pin H. The opening formed by the yoke E' in the cross-head E may be closed on opposite sides by plates *f*, attached by screws *f'*, and having in them openings *f*<sup>2</sup>, of sufficient size to admit of any side movement of the piston-rod. The plate *f* is omitted in Fig. 2 in order to show the swivel-block G more clearly. The pin or bolt H has a bearing in the cross-head both above and below the swivel-block G, and hence is afforded adequate support.

I do not claim, broadly, a pivotal connection between the piston-rod and cross-head of an engine; but

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

1. The combination, with a piston-rod, a cross-head constructed with a yoke at the middle of its length, and cross-head guides, of two

connecting-rods at the ends of the cross-head, and a swivel-block, in which the piston is rigidly secured, and which is pivoted to the cross-head within the said yoke and capable of movement upon its pivot within the said yoke, substantially as and for the purpose herein described.

2. The combination of the piston-rod sections B B', the cross-head E, constructed with the yoke E', the cross-head guides F, the con-

necting-rods F', the swivel-block G, and the pivot bolt or pin H, by which said block is connected with the cross-head, and which has a bearing in the cross-head both above and below said block, substantially as and for the purpose herein described.

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Witnesses:

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