

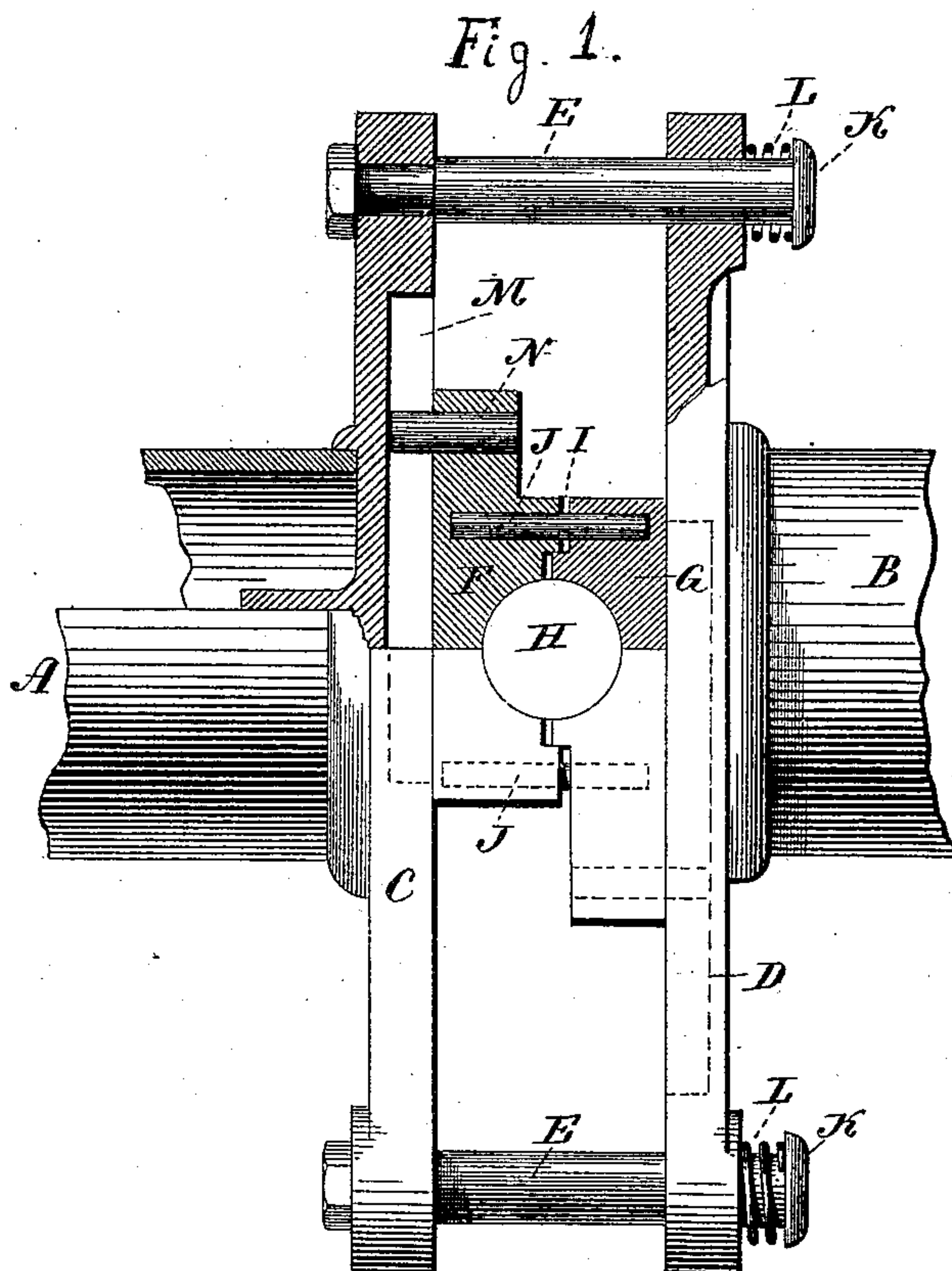
(No Model.)

2 Sheets—Sheet 1.

F. H. LAFORGE & H. J. BARKER.
SCOTCH YOKE.

No. 453,426.

Patented June 2, 1891.



Witnesses
J. H. Summway.
L. D. Kellogg.

Frederick H Laforge
and Hugh J Barker
Inventors,
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Earle Seymour

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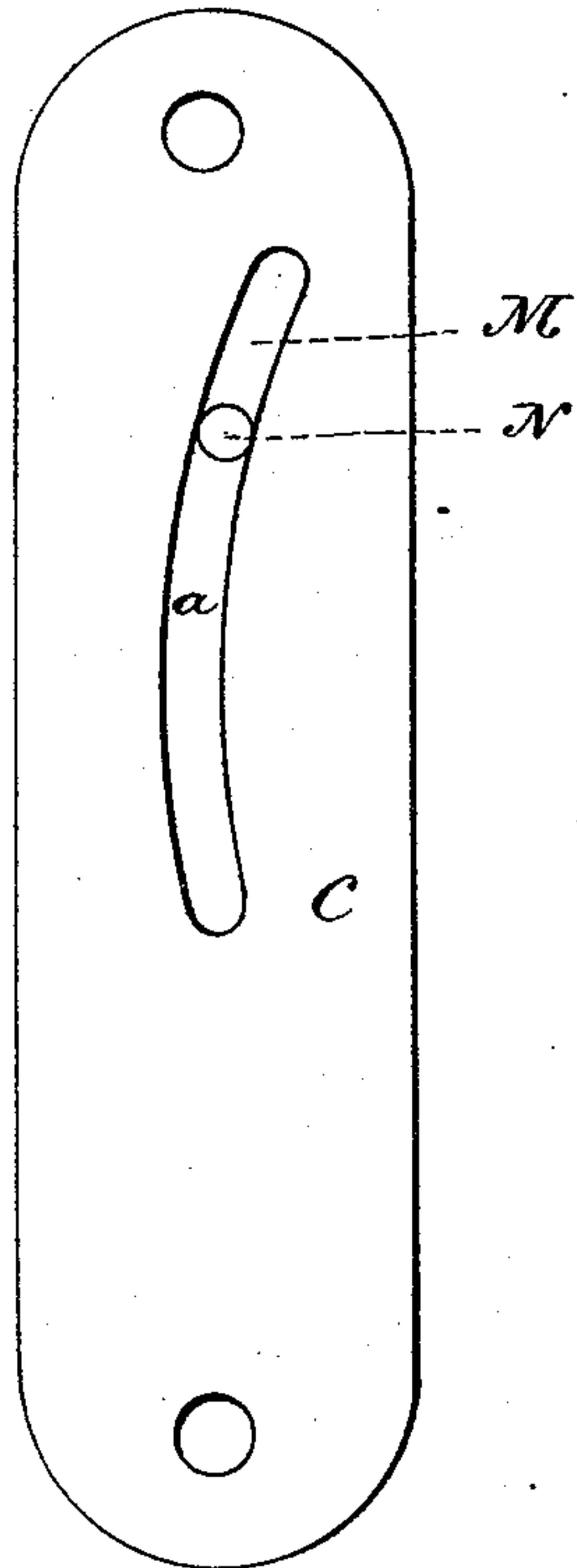
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Fig. 2



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UNITED STATES PATENT OFFICE.

FREDERICK H. LAFORGE, OF WATERBURY, CONNECTICUT, AND HUGH J. BARKER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE LAFORGE ENGINE COMPANY, OF JERSEY CITY, NEW JERSEY.

SCOTCH YOKE.

SPECIFICATION forming part of Letters Patent No. 453,426, dated June 2, 1891.

Application filed October 6, 1890. Serial No. 367,174. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK H. LAFORGE, of Waterbury, county of New Haven, State of Connecticut, and HUGH J. BARKER, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new Improvements in Scotch Yokes; and we do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a side view in partial longitudinal vertical section of the yoke and the crank-block as applied to a steam-engine; Fig. 2, a face view of the guide C.

This invention relates to an improvement in a device through which reciprocating movement is converted into the rotary movement of a crank, or vice versa, the said device consisting of a yoke in the form of a pair of parallel guides at substantially right angles to the path of the reciprocating movement, between which guides a block slides and in which block the crank-pin of a crank-shaft is arranged, so that the said yoke, reciprocating at right angles to the axis of the crank, will impart rotary movement to the crank, or vice versa, the crank-pin and the block it carries traveling between the said guides, this device being commonly called a "Scotch yoke," the said yoke being specially adapted to that class of steam-engines in which a pair of cylinders are arranged in line with each other, the adjacent ends open, a cylindrical piston arranged in each cylinder, the two pistons connected between the cylinders, forming a guide in which the crank-block operates, so that a reciprocating movement imparted to the pistons will through said block convert said reciprocating movement of the pistons into rotary movement of the crank, and is an improvement upon the yoke of the steam-engine for which Letters Patent No. 398,164 were granted to us February 19, 1889.

In the usual construction of such yokes the two parallel guides, between which the crank-block or slide operates, are rigidly connected.

In the construction of our engine it has been found difficult to make so perfect a fit between the slide or block and the guides as to prevent possible play. Such play, however slight, owing to the great rapidity with which the engine is operated, unavoidably produces a thump at each reversal of the stroke.

The object of our present invention is to construct the yoke so as to avoid all possible play between the parallel guides.

In operation in our said engine the thrust of the piston in imparting movement to the crank is alternately first one piston upon the guide it carries then the other piston upon the guide it carries, so that the tendency of the two pistons in operation is to press the guides toward each other. Taking advantage of this fact, our invention consists in uniting the two guides by a yielding connection, whereby the guides may approach each other under the pressure of the respective pistons and so that they will always bear firmly against the block, irrespective of imperfection of fit or wear of the block, and as more fully hereinafter described.

In illustrating the invention we show it as adapted to our said engine, but show only so much of the engine as necessary to the understanding of the invention.

A represents the piston-rod from one cylinder, and B the piston-rod from the other cylinder. To the piston-rod A the guide C is attached, which, as in our previous patent, is at right angles to the axis of the piston-rod A, and to the piston-rod B is a like guide D, parallel to the guide C. These guides are connected at their ends by studs E E, so as to hold them always in the same longitudinal plane with each other. The crank-block or slide, as here represented, is made in two parts F G, divided in a plane parallel with the plane of the face of the two guides and adapted to receive the crank-pin, the block being constructed with an opening H through it at right angles to the axis of the piston-rods and in which the crank-pin operates, as in our previous patent. The parts F G are constructed so as to leave a slight space I between them, the parts being connected by steady-

pins J, and so that while the two parts will properly embrace the crank-pin the space between them will allow of a contraction of the block under the wear of the crank-pin. Instead of rigidly connecting the two guides C D so that they unyieldingly stand at the same distance from each other, the studs E are made fast in one of the guides, as C, and pass freely through the other guide D and so as to allow the guide D and studs to play the one upon the other. Outside the guide D the two studs are provided with heads K, between which and the back of the guide D suitable springs L are arranged, the tendency of which is to force the two guides toward each other or yieldingly hold them at any position in which they may stand. The face of one or both of the guides is constructed with a cam-groove M, in which a stud N on the crank-slide works up and down as the slide so moves under the action of the crank, the same as in our previous patent, this cam-groove imparting to the guides and pistons an oscillatory movement, whereby the pistons may serve as valves. This feature, however, does not enter into the present invention, but, as illustrated in Fig. 2, the groove being of the same shape as in our said previous patent. The thrust of the pistons being against each other—that is to say, the thrust of the piston of the rod A is against the guide C when running in one direction, and the thrust of the piston of the rod B is against the other guide D when running in the opposite direction, the two pistons thus being opposed to each other—the tendency of the force is to press the two toward each other and against the crank-block between them. The springs L yieldingly hold the guides in these positions against the block. Consequently the guides will bear against the block at all times and so as to prevent any possible play between the block and guides and will take up whatever wear may occur between the crank and block or between the block and guides.

We have represented the crank-block as

divided, and this we prefer in order to readily take up the wear of the crank; but the block may be solid, if desirable.

In case the action is always in a direction tending to force the guides toward each other the springs L may be omitted; but we prefer to employ them to avoid any possible rattle or play of the parts which might otherwise occur.

While our invention is specially applicable to engines of the class of our patent before referred to, it will be understood that it is also applicable to yokes of this character employed for other purposes.

We claim—

1. In a combined yoke and crank for converting reciprocating into rotary motion, or vice versa, the yoke composed of two parallel guides at substantially right angles to the line of reciprocating movement, combined with a crank-block arranged between said guides and so as to slide therein under the rotation of the crank, the said guides yieldingly connected and so as to bear with yielding pressure upon the opposite sides of said block, substantially as described.

2. In a combined yoke and crank for converting reciprocating into rotary motion, or vice versa, the combination of two guides C D, the said guides being parallel, studs E E, connecting said guides, but passing freely through one of said guides, with springs between said studs and the guides tending to yieldingly force the guides toward each other, with a crank-block arranged between said guides and adapted to slide therein under the rotation of the crank, substantially as described.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

FREDERICK H. LAFORGE.
HUGH J. BARKER.

Witnesses:

J. B. THAYER, Jr.,
EDGAR DUDLEY FARIES.