

(No Model.)

2 Sheets—Sheet 1.

J. GRIME.
VALVE GEAR.

No. 512,956.

Patented Jan. 16, 1894.

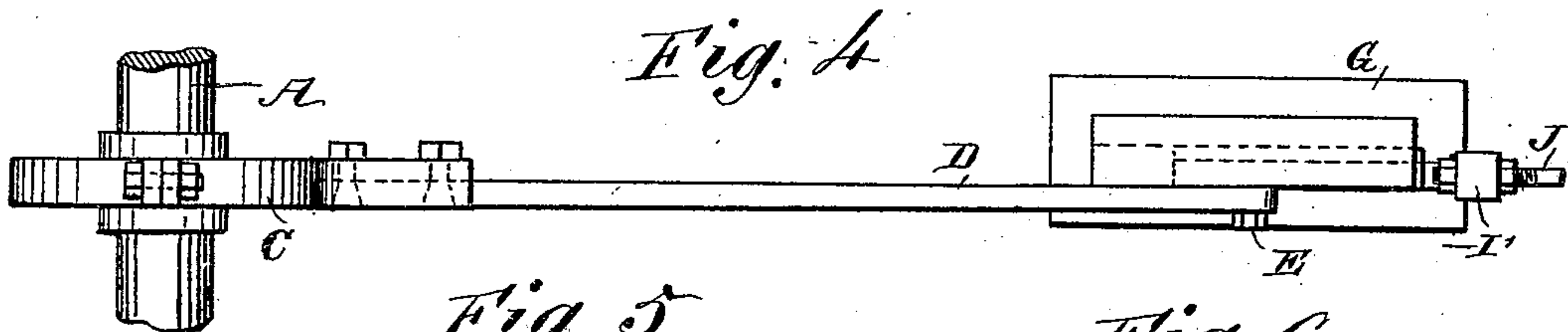
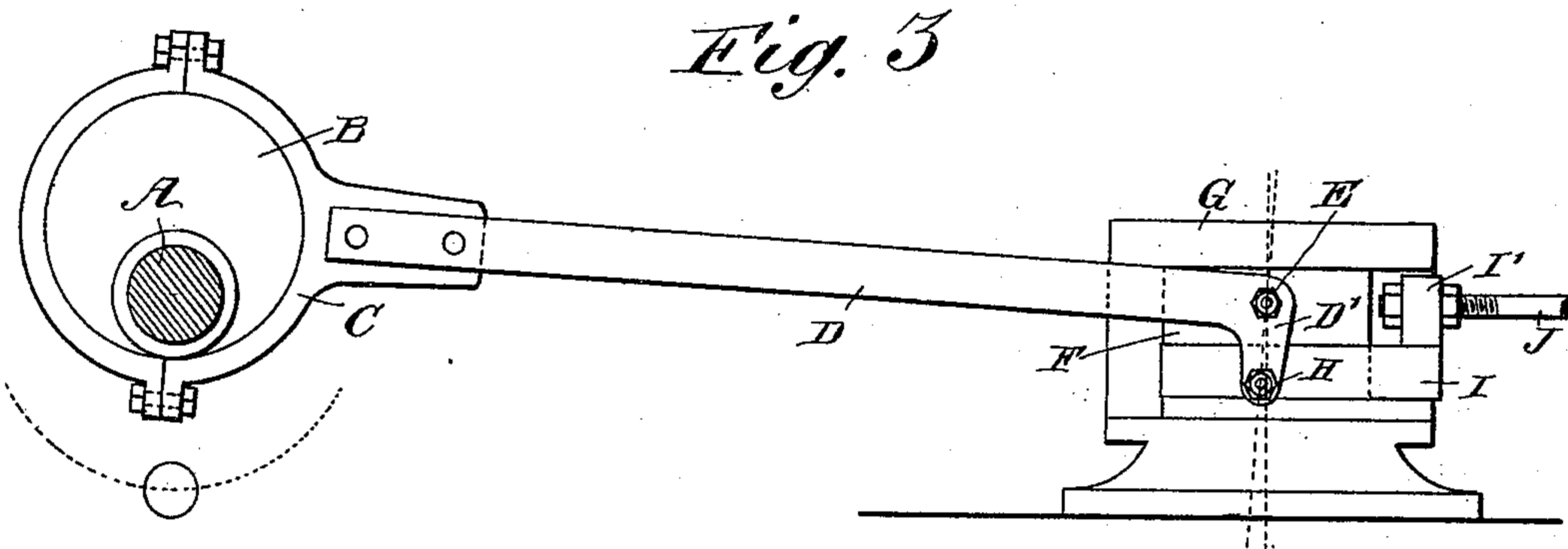
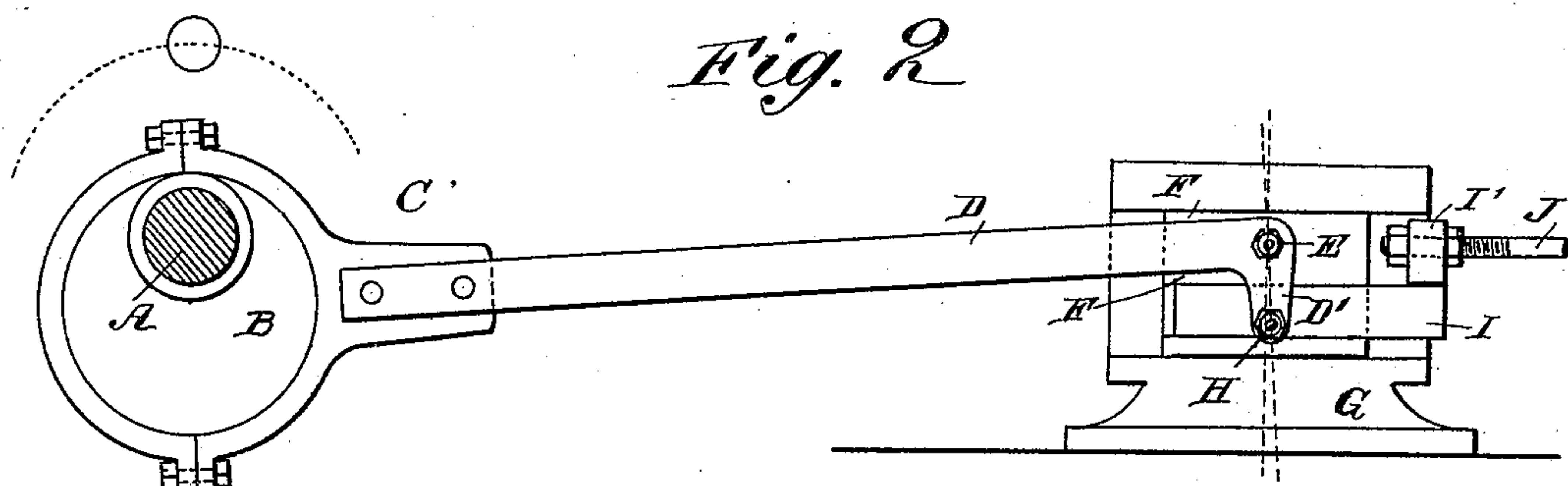
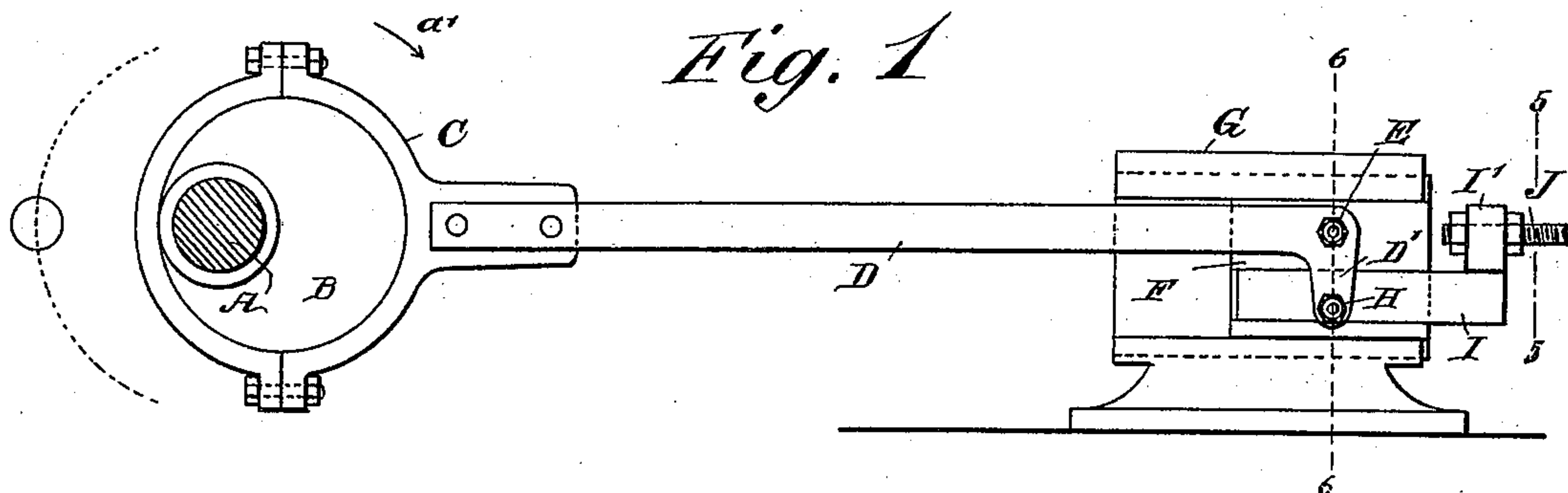
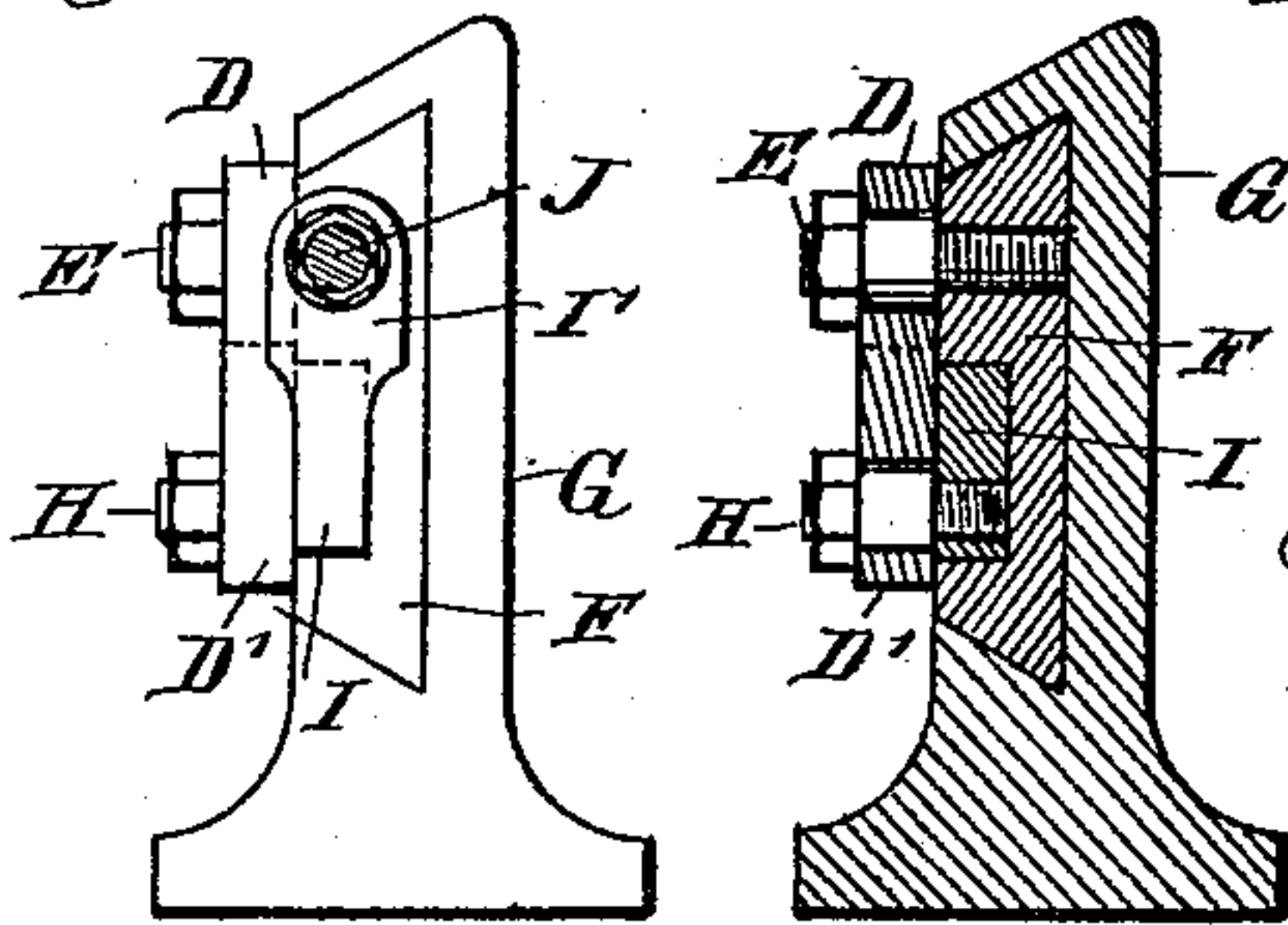


Fig. 5

Fig. 6



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(No Model.)

2 Sheets—Sheet 2.

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VALVE GEAR.

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Fig. 7

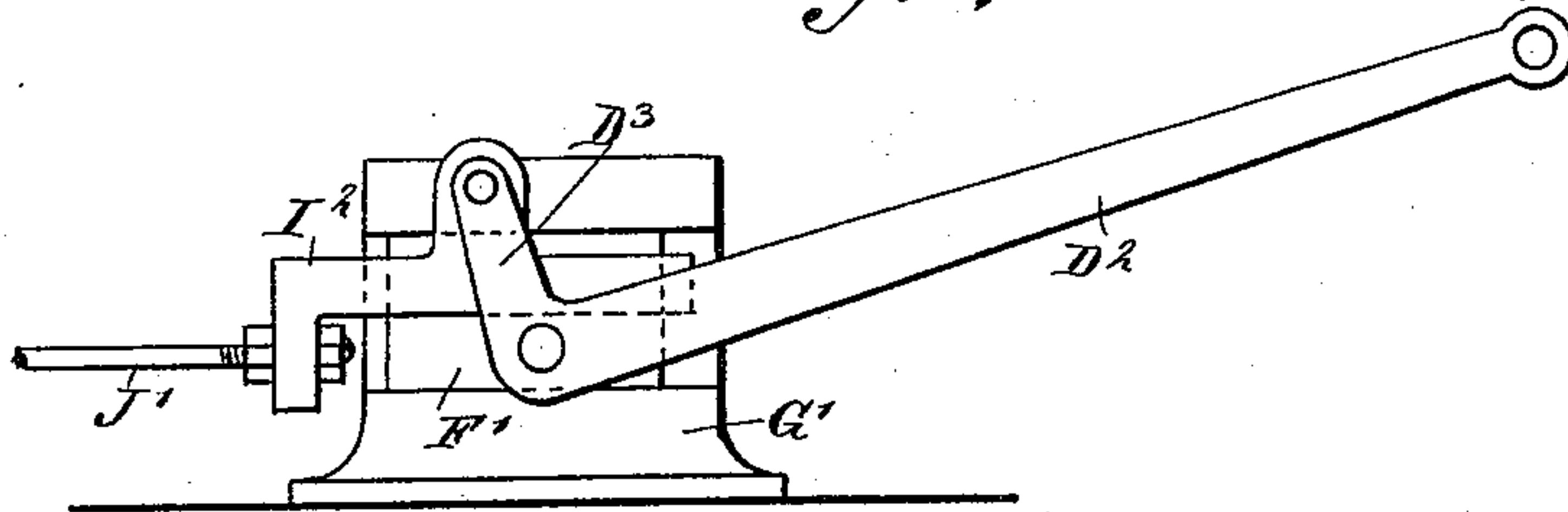


Fig. 8

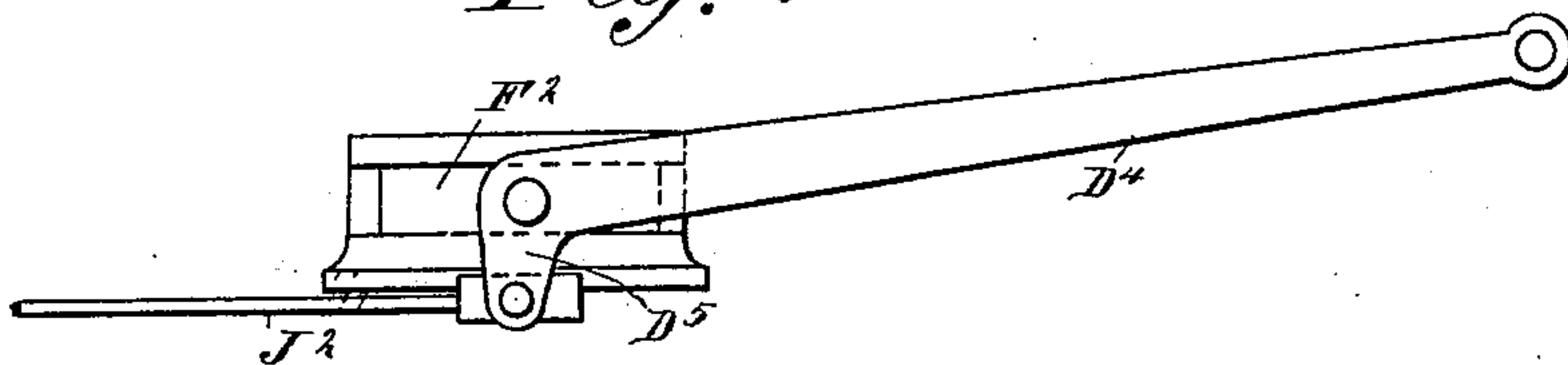


Fig. 9

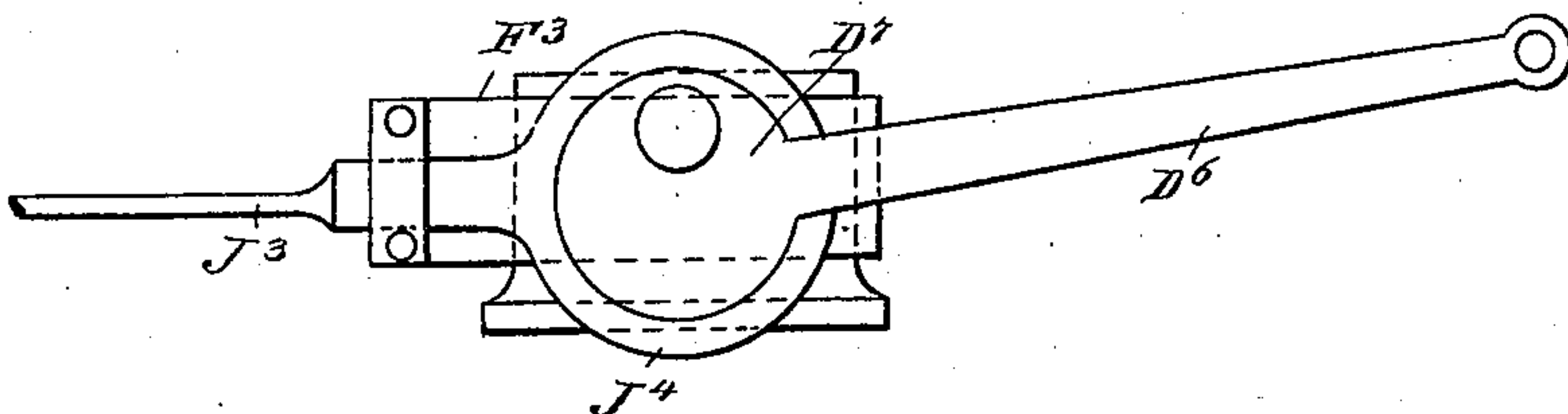


Fig. 10

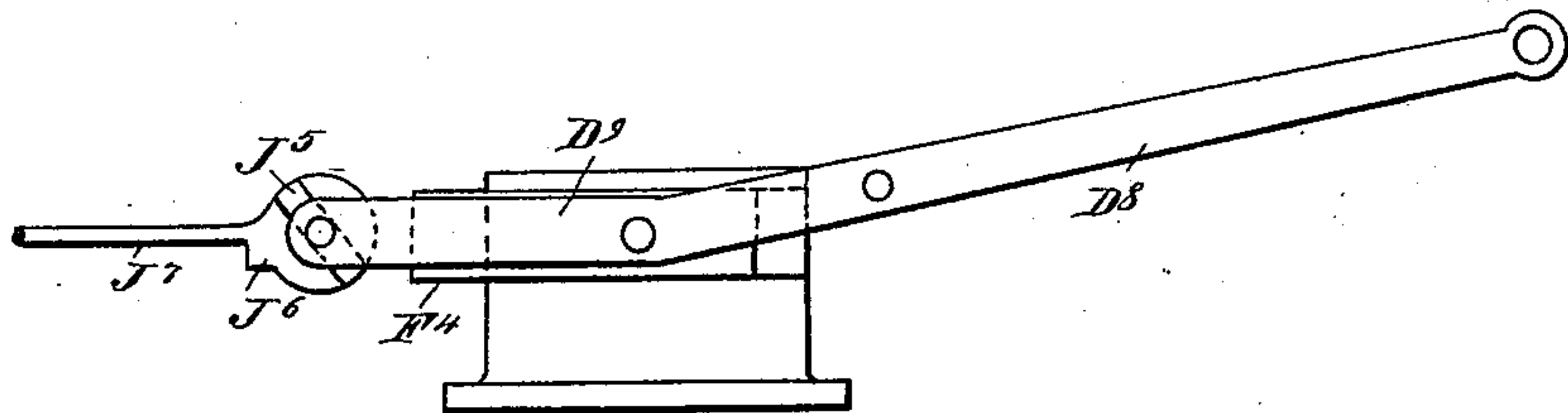
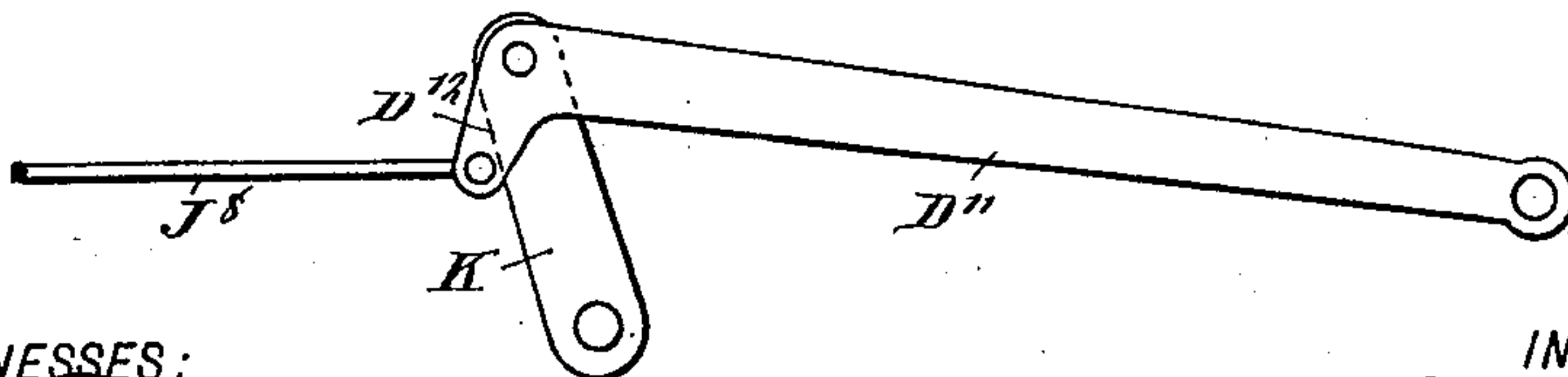


Fig. 11



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UNITED STATES PATENT OFFICE.

JOHN GRIME, OF MINNEAPOLIS, MINNESOTA.

VALVE-GEAR.

SPECIFICATION forming part of Letters Patent No. 512,956, dated January 16, 1894.

Application filed April 17, 1893. Serial No. 470,686. (No model.)

To all whom it may concern:

Be it known that I, JOHN GRIME, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Valve-Gears, of which the following is a full, clear, and exact description.

The object of the invention is to provide certain new and useful improvements in valve gears, whereby errors arising from the movement or position of the eccentric, are readily corrected to insure the proper running of the engine.

The invention consists of a connection between the eccentric rod and valve stem, to correct the throw or travel of the eccentric by the angular movement of the eccentric at both the forward and backward stroke.

The invention also consists of certain parts and details, and combinations of the same, as will be hereinafter described 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 all the figures.

Figure 1 is a side elevation of the improvement. Figs. 2 and 3 are similar views of the same in different positions. Fig. 4 is a plan view of the same. Fig. 5 is a cross section of the same on the line 5—5 of Fig. 1. Fig. 6 is a similar view of the same on the line 6—6 of Fig. 1; and Figs. 7, 8, 9, 10, and 11, are side elevations of modified forms of the improvement.

The improved valve gear as illustrated in the drawings, is for the purpose of relieving the guide-way and slide from any undue strain caused by the angular position the eccentric rod assumes during the time the engine is running, also where the center of the valve stem is below or above the center of the eccentric or engine shaft. This is shown more particularly in Fig. 8, where the valve stem is on a lower plane than the slide, and also for correcting errors in the travel of the valve caused by the angular position of the eccentric rod or crank pin of the engine. This may be carried out in various ways. I prefer, however, the construction illustrated in Figs. 1 to 6. On the driving shaft A is se-

cured an eccentric disk B, carrying the eccentric strap C, connected with the eccentric rod D, pivotally-connected at its forward end by a bolt E, with a slide F, fitted to move longitudinally in a suitable guideway G, attached to the frame of the engine.

On the forward end of the eccentric rod D is secured or formed an angular arm D', connected by a bolt H with an auxiliary slide I, fitted to slide longitudinally in the slide F and provided at its forward end with an offset I', connected in any suitable manner with the valve stem J carrying the slide valve in the usual manner.

When the main driving shaft A is running, then the throw of the eccentric is transmitted to the reciprocating slide F by means of the eccentric rod D and strap C, but at the same time the angular position assumed by the eccentric rod E during each revolution of the eccentric causes a swinging of the angular arm D', so that an accelerated motion is given to the auxiliary slide I, the latter moving at the same time with the slide F, on account of the connection with the eccentric rod D. When the several parts are in the position shown in Fig. 1, the eccentric is at the end of its innermost stroke, and when the shaft now revolves in the direction of the arrow α' , to a quarter position, as illustrated in Fig. 2, then a quarter travel is given to the slide F, but somewhat less movement is given to the slide I, as the angular position of the eccentric rod D retards, by the arm D', the movement of the slide I and consequently of the slide valve. During the next quarter movement of the eccentric the movement of the slide I is accelerated until the half-stroke of the eccentric is completed, when the slide F and the slide I again stand in the same position with relation to each other as at the beginning of the stroke, and shown in Fig. 1. During the next quarter movement of the eccentric the forward movement of the slide I is again retarded on account of the eccentric rod D assuming an angular position, as illustrated in Fig. 3, and during the last quarter revolution, the movement of the slide I is accelerated to bring the slides again into their relative positions shown in Fig. 1 at the completion of the stroke. Thus, it will be seen that by a

very simple device, the error due to the angular position of the eccentric rod is corrected by the auxiliary slide I connected by the angular arm D' with the eccentric rod D, connected with the slide F, as before described, and in which the auxiliary slide I is fitted to travel. The same result can be accomplished by the device illustrated in Fig. 7, in which the eccentric rod D² is connected with a slide F' held in a guideway G' and carrying an auxiliary slide I² connected with the valve stem J'. The angular arm D³ of the eccentric rod D² extends upward in this case and is pivotally-connected with the auxiliary slide I², as shown. The result is the same on the movement of the driving shaft, the only difference being that the accelerating and retarding movement is in a reverse order.

As illustrated in Fig. 8 the eccentric rod D⁴ is connected with the slide F², and its angular arm D⁵ is directly connected with the valve stem J², but the result is the same as above described in reference to the device illustrated in Figs. 1 and 7.

As shown in Fig. 9, the eccentric rod D⁶ is provided on its forward end with a disk D⁷, connected with the slide F³, in which is fitted to slide the valve stem J³ formed with an eccentric strap J⁴ fitted on the disk D⁷ of the eccentric rod D⁶. It will be seen that by this arrangement the angular position of the eccentric rod D⁶ causes a change in the position of the disk D⁷, whereby the eccentric straps J⁴ cause a retarded or accelerated motion of the valve stem J³ in the manner above described.

As shown in Fig. 10, the eccentric rod D⁸ is connected with the slide F⁴ and is connected by its angular arm D⁹ with an oblique slot J⁵, formed in a circular head J⁶ on the end of the valve stem J⁸. Now, the angular position of the eccentric rod D⁸ causes a shifting of the disk J⁶ to accelerate or retard the regular

movement of the stem J⁷ given by the connection with the slide F⁴ and eccentric rod D⁸.

As illustrated in Fig. 11, the eccentric rod D¹¹ is pivotally connected with a rocking arm K, and its angular arm D¹² is pivotally-connected with the valve stem J². Now, it will be seen that rocking motion is given to the arm K by the movement of the eccentric rod D¹¹, so that the slide valve connected with the stem J⁸ receives its full travel, but the movement thereof is corrected by the change of position of the angular arm D¹² on the forward and backward swinging of the arm K.

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

1. A valve gear provided with an eccentric rod, a valve stem separate from the eccentric rod, and a connection between the eccentric rod and valve stem, to correct the throw of the eccentric by the angular movement of the eccentric rod, substantially as shown and described.

2. A valve gear comprising an eccentric, an eccentric rod a valve stem, separate from the eccentric rod and a connection between the valve stem and the eccentric rod of the said eccentric, so that the throw of the eccentric given to the valve stem is corrected by the angular movement of the eccentric rod, substantially as shown and described.

3. A valve gear comprising an eccentric rod pivoted near that of its ends which is most remote from the operating shaft, and having an extension at the said pivot end, and a separate valve stem connected with the said extension, in such manner that the extension is capable of an angular movement in relation to the valve stem, substantially as and for the purpose set forth.

JOHN GRIME.

Witnesses:

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WILLIAM WAGNER.