

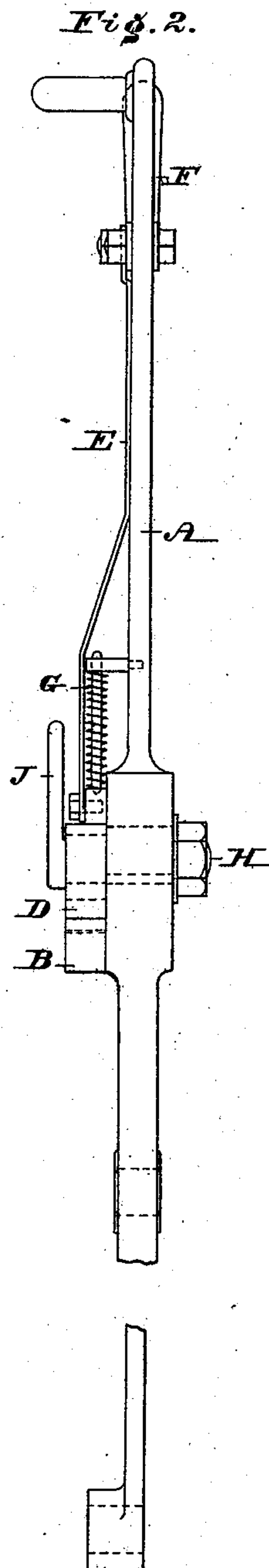
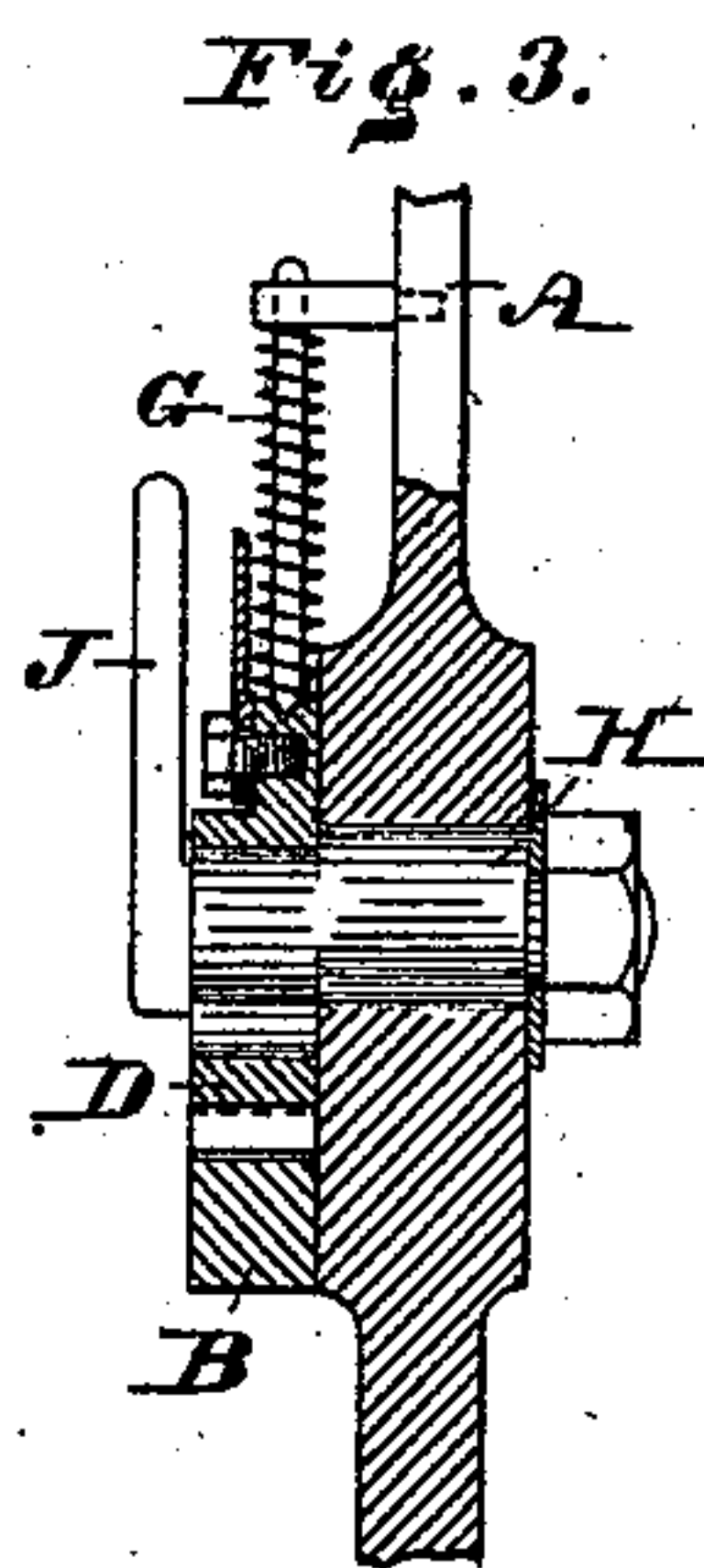
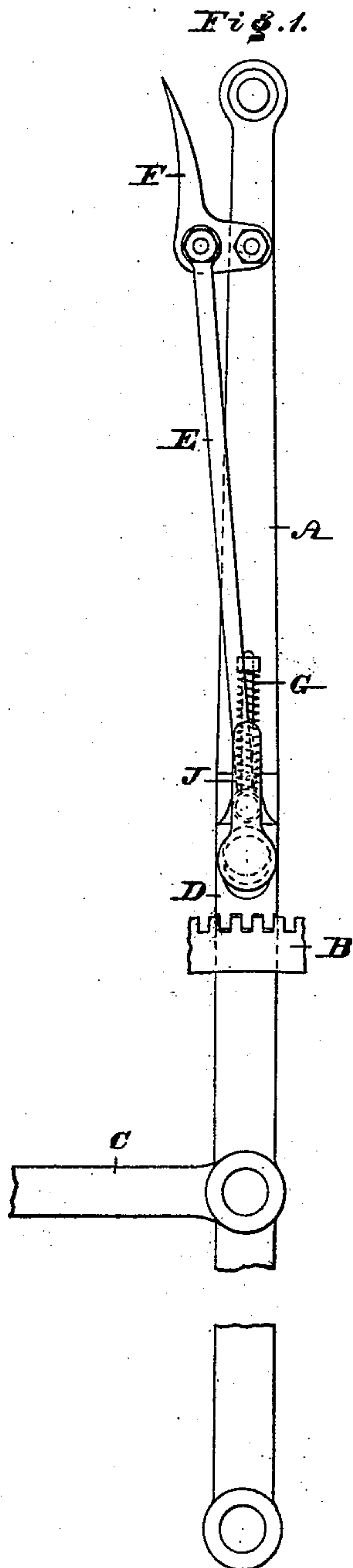
(No Model.)

W. E. HALL.

REVERSING LEVER FOR ENGINES.

No. 376,882.

Patented Jan. 24, 1888.



Witnesses:
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UNITED STATES PATENT OFFICE.

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REVERSING-LEVER FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 376,882, dated January 24, 1888.

Application filed January 7, 1887. Serial No. 223,661. (No model.)

To all whom it may concern:

Be it known that I, WILLIS E. HALL, a citizen of the United States, residing at Altoona, in the county of Blair, State of Pennsylvania, have invented a new and useful Improvement in Reversing-Levers for Engines, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figures 1 and 2 represent side elevations of reversing-levers for engines, embodying my invention. Fig. 3 represents a longitudinal section of a portion in line $x x$, Fig. 1.

Similar letters of reference indicate corresponding parts in the several figures.

The mechanical construction at present used on locomotive-engines for the purpose of varying the grade of expansion of the steam, consisting of a rack, reverse-lever, and latch, does not admit of a sufficiently close adjustment of the cut-off, which necessitates throttling the steam more or less to obtain the proper working-pressure for the grade of expansion which it may be necessary to use.

The reverse-lever commonly used is constructed so as to move forward or backward between two notched quadrants, and a latch on the lever, governed by a spring, engages with any one of the notches desired, and locks the lever; but, as a definite size of tooth on the quadrant is necessary for proper strength, it is found impossible to obtain a close adjustment of the cut-off by the use of such mechanism.

Various means have been suggested for overcoming the above difficulty—such as increasing the number of teeth in the quadrant, or employing steam or hydraulic reversing-gears, or a lever with two or more latches—but, as far as I am aware, the use of any of these has not satisfactorily produced the desired result.

The purpose of my invention is to retain the desirable features of the construction—as, for instance, in locomotives—of the lever, rack, and latch, by which the engine can be easily and rapidly reversed, together with the simplicity of the mechanism, but to so change the construction that the lever can be easily and readily placed into any of the possible positions within the range of the rack, by which means any of the possible grades of expansion can be

obtained and the full boiler-pressure utilized and the loss resulting from throttling the steam and using low grades of expansion obviated.

To this end my invention consists of an inclined plane applied to the surface of the device which connects the lever with the latch, a convenient form being a revolving bolt the surface of which is eccentric. To allow the lever to be placed in any of the possible positions within the range of the rack, I construct the eccentric of the bolt so that the throw thereof is equal to the sum of a notch and the distance between two notches of the quadrant.

Referring to the drawings, A represents a reversing-lever; B, the quadrant provided with a rack or notches; C, the reach-rod; D, the latch which engages with the notches, and E the link which is connected with the latch D and the latch-handle F.

G represents a spring which is attached to the lever A and bears against the latch D, thus holding the latter in engagement with the notches of the quadrant.

The latch, made to rise and fall, is connected with the lever A in Figs. 1, 2, and 3 by means of a bolt, H, which is rotatably fitted in said latch, and has an eccentric portion which freely enters a slot in said lever, one end of the bolt having a handle, J, whereby the bolt may be readily rotated for adjusting purposes.

The working of the particular form described, and as applied to locomotives, is about as follows: When starting a train, the reverse-lever is placed in full throw until the train is well under way, when the lever is moved toward the center of the quadrant or dead-point, by which means the point of cut-off is made earlier and the ratio of expansion increased. For every train (grade and speed desired) there is one position of lever or ratio of expansion which gives the most economic results.

With the construction as at present used, on account of not allowing a sufficiently fine adjustment, it is found necessary to place the lever in such a position as will give a later cut-off and therefore a lower grade of expansion, and to throttle the steam below the boiler-pressure, which, as is well known, is not conducive to economy. To overcome this I make the surface of the device connecting the reverse lever and latch upon the principle of the inclined plane, and movable, as already de-

scribed. The relative positions of the latch and lever can be so changed that any point of cut-off can be obtained, which therefore allows the use of the full boiler-pressure and the proper grade of expansion. With the eccentric-bolt, by turning the handle upon the bolt to the right or to the left, the lever will be thrown back or forward, as may be desired. It is preferable to make the total throw of the bolt equal to the distance of a notch and a space; for if this does not give sufficient change of motion it will be seen that the latch can be lifted and the lever moved back or forward one or more notches, when the lever can be adjusted by means of the eccentric-bolt to the desired intermediate position.

By the above-described mechanism it will be seen that any possible position of the reverse-lever within the range of the rack can be obtained, while retaining the desirable features of the present construction, such as rapidity of handling, &c. So, also, the construction can be such as to have the latch upon the side passing through the center or in front of the reverse-lever.

The essential feature of my invention is the application of the principle of the inclined plane to the surface of the device or mechanism connecting the reverse-lever latch with the reverse-lever, by the motion of which the relative position of lever and latch can be altered, which, together with the notched quadrant, allows the lever to be placed in any of the possible positions within the range of the rack.

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

1. An adjustable device for controlling expansion in locomotive and other steam-engines, consisting of the quadrant B with notches, the reversing-lever A with slot therein, the reach-rod C, the latch D, the bolt H, rotatably fitted in said latch and having an eccentric portion working in the slot of the lever A and provided with the handle J, the link E, connecting said latch to its handle F, the latter pivoted to the lever A, and the spring G, bearing against the lever A and the latch D, all of said parts being arranged and combined substantially as described.

2. In a device of the character described, the combination of a lever provided with a reach-rod and having a bolt with an eccentric portion connected thereto, the said bolt having a latch pivoted thereto, and a notched quadrant, the throw of the eccentric of the bolt being equal to the length of a notch of the quadrant plus the distance between two notches thereof, all substantially as described.

3. In a device of the character described, a slotted reversing-lever having a latch connected thereto, in combination with a notched quadrant, a bolt having an eccentric working in the slot of the reversing-lever, and a spring bearing against the said lever and latch, said parts being substantially as and for the purpose set forth.

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