(No Model.)

W. A. CLARKE.

REVERSING GEAR FOR ENGINES.

No. 298,826. Patented May 20, 1884.

Fig. 1.

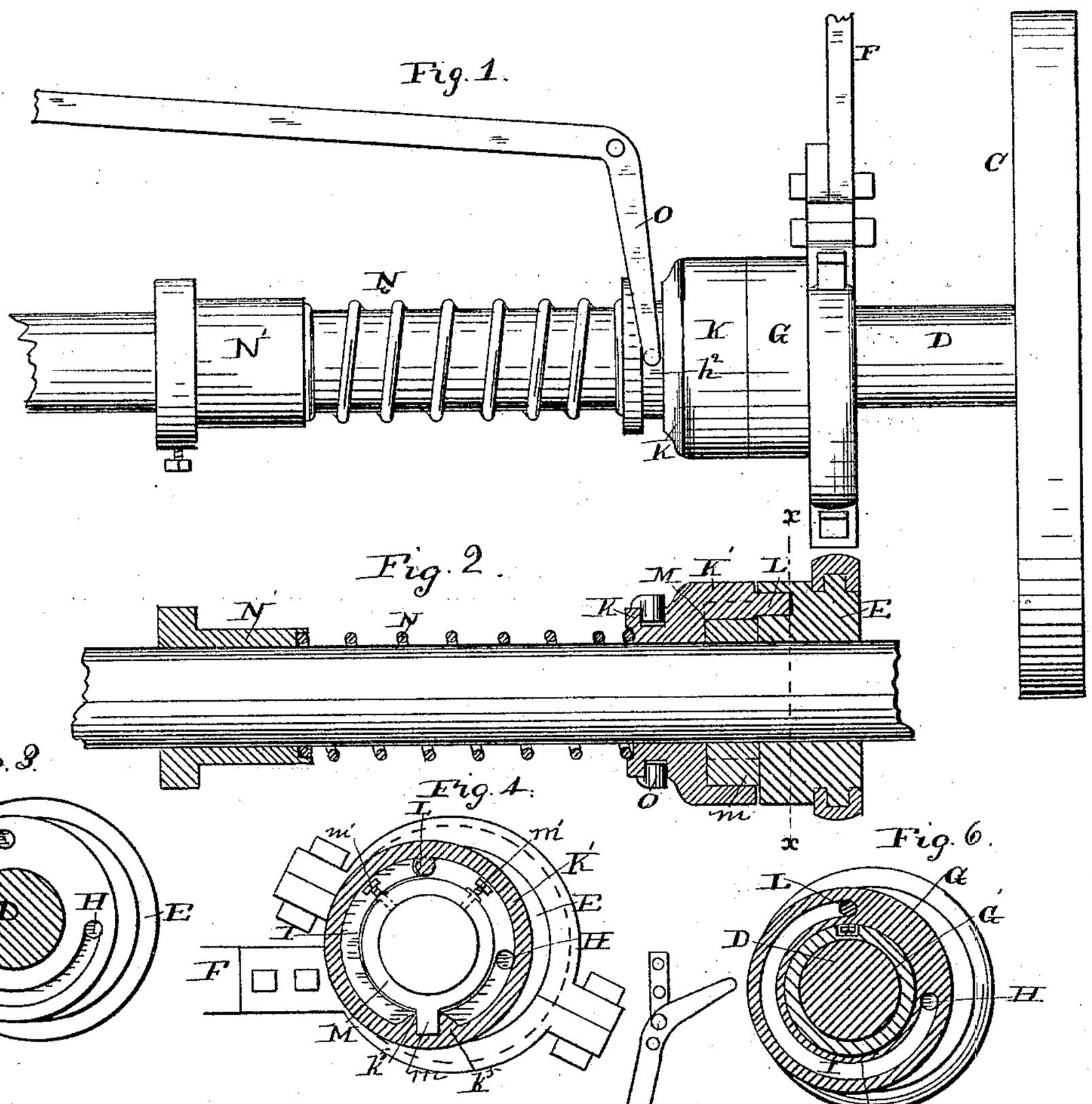


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 6.

Fig. 7.

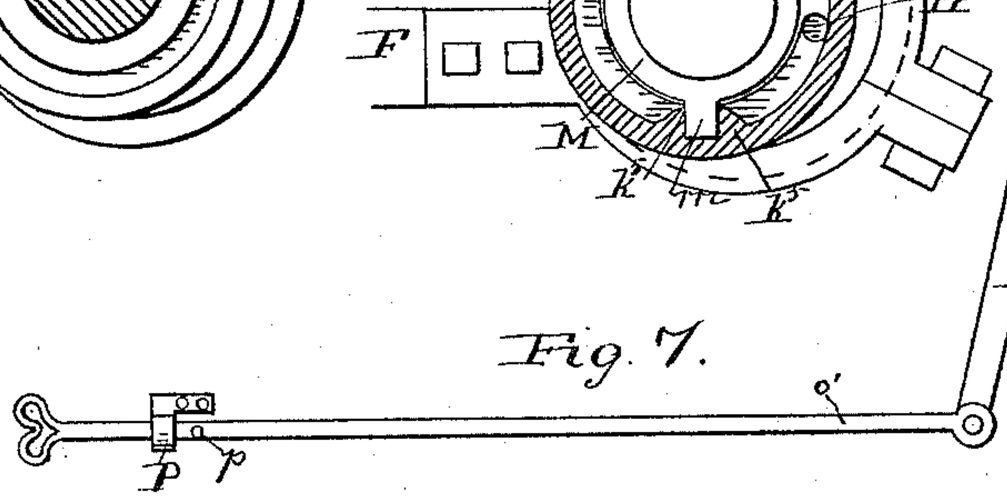
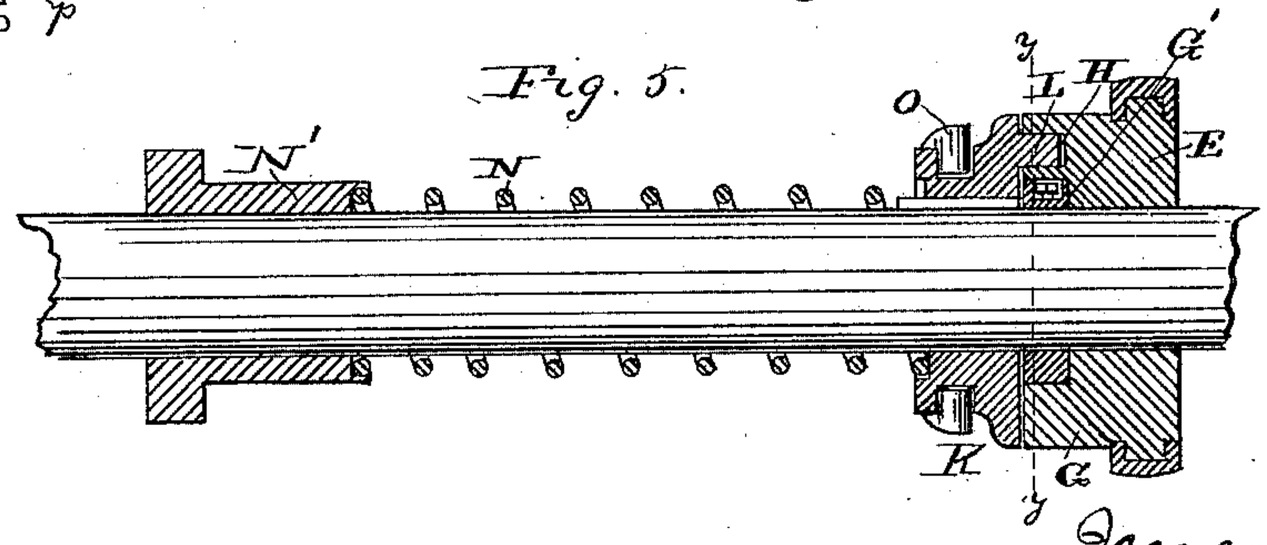


Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLARD A. CLARKE, OF STILLWATER, MINN., ASSIGNOR TO THE NORTH WESTERN MANUFACTURING AND CAR COMPANY, OF SAME PLACE.

REVERSING-GEAR FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 298,826, dated May 20, 1884.

Application filed March 12, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLARD A. CLARKE, a citizen of the United States, residing at Stillwater, in the county of Washington and State of Minnesota, have invented certain new and useful Improvements in Reversing-Gear for Steam-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a top plan view of a sufficient portion of an engine to illustrate the method of applying my invention thereto. Fig. 2 is a sectional view of the clutch mechanism, the shaft being shown in side elevation. Fig. 3 is a face view of the eccentric and governor-pulley detached. Fig. 4 is a transverse section on the line *x x*, Fig. 2. Fig. 5 is a longitudinal section of a slightly-modified form. Fig. 6 is a transverse section on the line *y y*, Fig. 5; and Fig. 7 is a view of the shifting-lever.

The invention relates to improvements in the device for reversing an engine or reversing the direction of rotation of the main engine-shaft.

It relates more especially to improvements in reversing-gear of the class having sockets in the face of the eccentric, or in the face of a hub or collar carried by the eccentric, with which sockets alternately a pin engages, the pin being connected with the shaft by means of a sliding collar, which carries it, and which is connected to said shaft.

As shown, there is a crank-wheel, C, upon the main engine-shaft D.

E is the eccentric, mounted on the main engine-shaft and related to the valve in any suitable way, and connected therewith by the rod F. The eccentric is loose upon the shaft, and with it is formed or to it is attached the governor-pulley G. In this part G are formed sockets or recesses H, which are adapted to receive and engage with a pin, to be described. The sockets are equidistant from the shaft and a suitable number of degrees apart.

I represents a groove or slot cut in the face of the pulley concentric with the shaft, and extending from one of the sockets H to the other. Preferably this slot is about three-quarters of an inch wide and half an inch deep. Instead of forming these in the governor-pulley, they may be formed directly in the face of the eccentric itself, or in the face of a hub, collar, or plate carried by the eccentric. Immediately adjacent to this governor-pulley, flange, hub, or collar G there is arranged a sliding cup-shaped part, consisting of a collar or hub portion, K, and a flange part, K′. It carries the pin L, which is rigid relatively to the hub or collar, and projects from it toward the eccentric, and is adapted to engage with one or the other of the sockets or recesses H. The sliding part K K′ is keyed to the shaft either by an ordinary spline or feather, as shown in Fig. 5, or by means of an expanded disk or hub, as at M, Figs. 2 and 3. In the latter case the part M is provided with a spline or feather, *m*, and with set-screws *m′*, by means of which it can be fastened in any proper position.

N represents a coiled spring around the shaft, one end of which bears against a fixed collar or equivalent device at N′, the other end bearing against the sliding part K K′. The spring constantly tends to force the part K K′ toward the eccentric, and therefore to force the pin L into one or the other of the sockets H. A spring of the character shown is much more effective and much surer in its operations than are those above alluded to, mounted eccentrically relatively to the shaft in a comparatively small socket in a fixed hub or collar, and arranged to bear against the connecting-pin. Especially is this the case when the pin has been connected with the sliding collar loosely, as has generally been the custom in mechanisms of this sort.

O represents a forked shipping-lever, the arms of which engage with the sliding part K K′ by means of a groove, h^2, therein. In an engine having a steam-dome above the boiler the lever O is bent, and is pivotally connected to a sliding hand-lever, O′. The latter is mounted in one or more bearings, as at P, and is provided with a pin or stop, *p*, so situated that when a pull is exerted upon the lever O′ the sliding part K K′ shall not be drawn too far away from the eccentric. The part K K′ should not be drawn so far as to withdraw the end of the pin from the groove or slot I, and

therefore said groove can be utilized to insure that the pin shall instantly engage with the next socket or recess.

In operation, when it is desired to reverse the engine by means of the mechanism described, it is done by pulling upon the lever, which, through the shipping-lever, draws the pin out from the socket H, with which it is engaged, and after it is withdrawn the eccentric is held stationary by the friction of the valve upon its seat, and the shaft, together with the sliding part K K′ and its pin L, continues to revolve until the latter reaches the other socket, which it is caused to enter by reason of the tension of the spring N. This results in a reversing of the engine, as will be readily understood. The groove I overcomes the difficulty heretofore experienced with devices of this sort—namely, the failing of the pin to engage with the next socket at the proper time. When the groove is used, it is practically impossible for the pin to pass beyond said socket. In the construction shown in Figs. 2 and 3 the part K′ has preferably inwardly-projecting flanges or ribs engaging with the rib *m*, these parts operating to hold the sliding part properly in position relatively to the shaft. As said above, these parts, however, may be dispensed with without departing entirely from my invention. Thus in Figs. 5 and 6 there is shown a sliding part, K K′, engaging directly with the eccentric or governor-pulley, the latter being preferably provided with a groove or annular recess, in which is fitted a collar, *e*, to hold the eccentric in proper place on the shaft.

I prefer to form the sliding part K K′ and connect it to the shaft as shown in Figs. 2 and 3. This arrangement makes a more comely appearance, covers up entirely the screws *m′*, which are otherwise liable to catch the governor-belt should it run off its pulley, and also shortens the parts, which is a great advantage. It is also preferable to a connection by feather or key, which it is necessary to fit and adjust with great nicety, in order to set the valve in its proper position. In both constructions shown the eccentric is prevented by a stop from longitudinal movement relative to the engine-shaft in the direction in which the sliding collar moves when the pin is withdrawn from one of the sockets in the face of the eccentric. In the construction shown in Figs. 1, 2, 3, 4 the disk or hub M serves as the stop referred to, one face of this hub being in close contact with the face of the eccentric E, (see Fig. 2,) and as the hub is firmly secured to the crank-shaft by the set-screws *m′ m′*, it is apparent that the eccentric cannot slide longitudinally on the crank-shaft in the direction in which the sliding collar K K′ moves when the pin L is withdrawn from one of the sockets H. In the construction shown in Figs. 5 and 6 the collar G′ thus serves as a stop, it being firmly attached to the crank-shaft by means of a set-screw, thus preventing any longitudinal movement of the eccentric upon the shaft in the direction in which the collar K is moved when the pin H is withdrawn from the socket.

I do not claim in this case the invention claimed in my Patent No. 272,648, dated February 20, 1883, the same being granted upon an application which was a division of a prior application of mine, Serial No. 79,316, filed December 14, 1882; nor do I claim in this case any inventions except those specifically recited in the claims, reserving the right to claim other patentable subject-matter in my other said application No. 79,316, of which this is a division.

What I claim is—

1. In a reversing mechanism for a steam-engine, the combination of the following elements, namely: the engine-shaft, the loose eccentric, and the opposing continuously-rotating collar, one of which can slide relatively to the other on the shaft, and of which one is provided with a pin or projection and the other with seats or recesses to receive the pin, a stop arranged between the collar and the eccentric and adapted to engage with the opposing face of the eccentric, and mechanism, substantially as set forth, whereby the pin is held in its seat.

2. In a reversing mechanism for a steam-engine, the combination of the following elements, namely: the engine-shaft, the loose eccentric, and the opposing continuously-rotating collar, one of which can slide relatively to the other on the shaft, and of which one is provided with a pin or projection and the other with seats or recesses, the intermediate collar adjustably secured to the engine-shaft, means, substantially as set forth, connecting said collar with the continuously-rotating collar and its attached pin, and mechanism, substantially as set forth, whereby the pin is held in its seat.

3. In a reversing mechanism for a steam-engine, the combination of the following elements, namely: the engine-shaft, the eccentric loosely fitted on the shaft and provided with two recesses or seats, one for the forward and one for the backward movement, a collar made movable toward and from the eccentric, a pin attached to the collar and adapted to engage with either of the seats of the loose eccentric, a collar adjustably connected with the shaft and provided in its outer face with a spline, a groove in the sliding collar to receive the spline, and mechanism, substantially as set forth, whereby the pin is held in its seat.

4. In a reversing mechanism for a steam-engine, the combination of the following elements, namely: the engine-shaft, the loose eccentric, and the opposing continuously-rotating collar, one of which can slide relatively to the other on the shaft, and of which one is provided with a pin or projection and the other with seats or recesses, and with stops which project toward the pin-support beyond the plane of rotation, in which the end of the pin moves immediately after it is disengaged from either of the sockets, to prevent the pin from rotating beyond the seats or recesses, substantially as set forth.

5. In a reversing mechanism for steam-engines, the combination of the following elements, namely: the engine-shaft, the loose eccentric, and the opposing continuously-rotating collar, one of which can slide relatively to the other, and of which one is provided with a pin or projection and the other with sockets or recesses, and is provided further with a part-circular groove connecting said sockets upon one side only of the sockets or recesses, substantially as set forth.

6. In a reversing mechanism for steam-engines, the combination of the following elements, namely: the engine-shaft, the eccentric fitted loosely on the shaft and provided with two recesses or seats—one for the forward and one for the backward movement—the sliding collar provided with a pin adapted to enter the recesses, the part-circular groove connecting the recesses, and mechanism, substantially as set forth, whereby the pin may be alternately withdrawn from and held in its seat.

In testimony whereof I affix my signature in presence of two witnesses.

WILLARD A. CLARKE.

Witnesses:

WILLIAM F. BARSTOW,

WILLIAM H. PEOPLES.