(No Model.)

# H. MOEHRING & A. PFLÜGER.

## MECHANICAL MOVEMENT.

No. 383,407. Patented May 22, 1888.

*Fig. 1.*

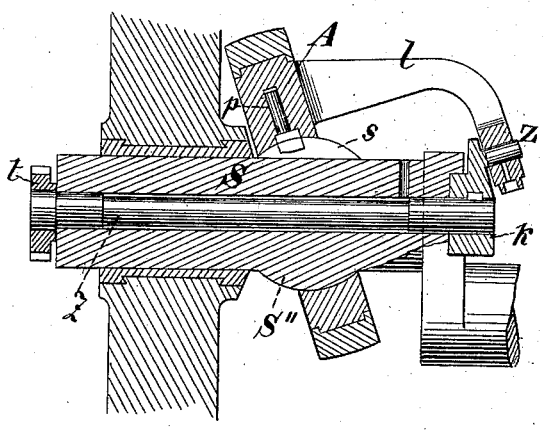



*Fig. 2.*

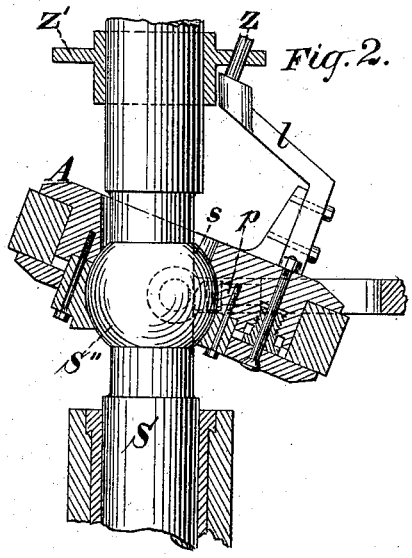



*Fig. 3.*

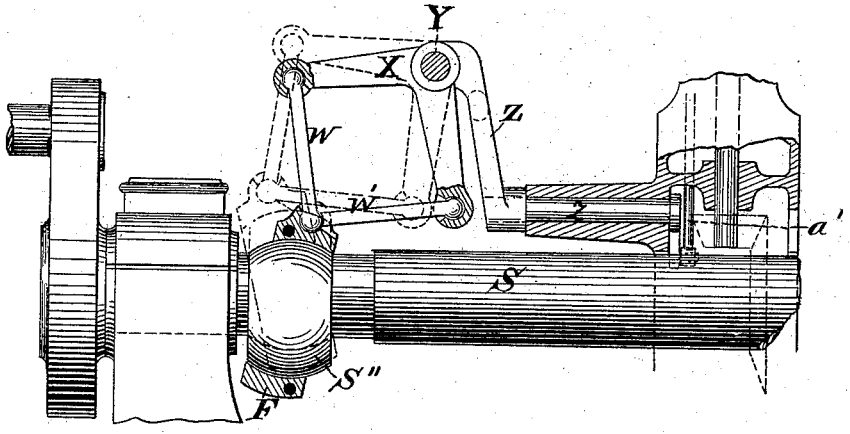



*Fig. 4.*

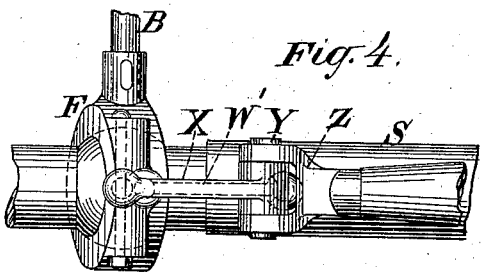
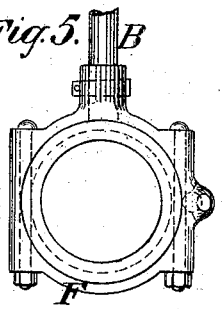



*Fig. 5.*

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# UNITED STATES PATENT OFFICE.

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## MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 383,407, dated May 22, 1888.

Application filed February 13, 1888. Serial No. 263,786. (No model.) Patented in England April 7, 1886, No. 4,859; in France April 7, 1886, No. 175,333; in Belgium April 7, 1886, No. 72,682; in Germany April 8, 1886, Nos. 37,554 and 40,827, July 10, 1886, No. 41,149, and December 14, 1886, No. 41,921; in Italy June 30, 1886, No. 19,777, and June 30, 1887, No. 21,552, and in Austria-Hungary September 13, 1886, No. 14,984 and No. 41,064.

*To all whom it may concern:*

Be it known that we, HERMANN MOEHRING, a citizen of the United States, domiciled at Frankfort-on-the-Main, in the Kingdom of Prussia, Empire of Germany, but now temporarily residing at the city, county, and State of New York, and ALBERT PFLÜGER, a subject of the Emperor of Germany, residing at Frankfort-on-the-Main, in the Kingdom of Prussia, Empire of Germany, have invented certain new and useful Improvements in Mechanical Movements; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, (for which the following patents have been granted: England April 7, 1886, No. 4,859; Germany April 8, 1886, No. 37,554 and No. 40,827, addition thereto July 10, 1886, No. 41,149, and December 14, 1886, No. 41,921; France April 7, 1886, No. 175,333, and addition thereto March 31, 1887; Austria-Hungary September 13, 1886, Nos. 14,984 and 41,064; Italy June 30, 1886, No. 19,777, and addition thereto June 30, 1887, No. 21,552; Belgium April 7, 1886, No. 72,682; Certificate of Addition March 31, 1887.)

This invention comprises certain new and useful combinations of parts, whereby is provided a mechanical movement suitable for various purposes—as, for example, the working of that variety of valves for steam-engines and similar motors in which the valve has a longitudinal movement to open and close the ports, and also a lateral or oscillating movement to determine the point of cut-off—our said invention being also useful in many other classes of mechanism requiring in their operation a combined lateral and longitudinal movement.

Figures 1, 2, and 3 are respectively longitudinal sectional views illustrating the construction and operation of three several modifications of our said invention. Fig. 4 is a plan view of certain parts represented in Fig. 3, and Fig. 5 is a face view, taken in a plane at right angles to Fig. 3, of certain parts shown in Figs. 3 and 4.

Referring first to Fig. 1, A is the eccentric, and *z* a small shaft going through the center of the main shaft S. On one end of the shaft *z* the little crank *k* is fastened and the crank-pin Z thereof is inclined. The eccentric is mounted on a spherical portion, S″, of the main shaft and prevented from turning around on the said shaft by the pin or carrier *p*, or other suitable connection, which, however, in consequence of the slot *s*, permits the eccentric to change its position. The eccentric A is provided with an arm, the end of which is movable on the inclined crank-pin Z. The shaft *z* on its outer extremity carries a pinion, *t*, or other suitable attachment, by which it may be connected with a speed-governor or other device for turning it in one direction or the other, as may be desired. While the eccentricity of the eccentric determines the longitudinal stroke of its rod, its inclination gives a lateral, transverse, or oscillating movement thereto, and the period during the longitudinal stroke at which said oscillating movement occurs is determined by the position of the inclination of the eccentric, which, as explained, is readily changed or controlled.

The same principle of operation inheres in the other modifications of our said invention—as, for example, in that shown in Fig. 2, in which, instead of the crank *k* and the mechanism for turning it or changing its position, the arrangement is as follows: The eccentric is of course mounted upon its shaft, so as to be rotated therewith and to rotate within its eccentric-strap. Said eccentric is provided with the arm *l*, which by means of its inclined pin Z is movably connected with the disk Z′, which may be attached to a speed-governor or other device for turning it in one direction or the other. By turning this disk, or, as shown in Fig. 1, by turning the shaft *k*, a change in the position of the inclination of the eccentric is secured.

In the modifications shown in Figs. 3, 4, and 5, S is the main shaft, and S″ a spherical portion thereof, which is eccentric, as shown in Fig. 3, and which rotates within its eccentric-strap F, to which is attached the eccentric-rod

B. The eccentric-strap is pivotally connected by a lever, W, with one arm of the bell-crank X. A second lever, W′, connects the other arm of this bell-crank pivotally with the eccentric-strap F. The fulcrum Y of the bell-crank is carried by the crank-arm Z, to which is attached the shaft *z*. Any suitable speed-governor or other device may be connected with the shaft *z* to turn it in one direction or the other, and in the drawings a portion of the usual two-ball vertical governor is shown, as at *a′* in Fig. 3.

The operation is as follows: In consequence of the eccentricity of the spherical portion S″ of the main shaft S, we obtain the usual longitudinal motion of our eccentric-rod B. The motion of the eccentric-strap operates, however, also on the parallelogram W *x* W′, and causes thereby, as seen by the dotted lines, a transverse oscillating motion of the eccentric-rod. The period, sooner or later, when this transverse motion takes place relative to the longitudinal motion depends on the position of the crank-arm Z, consequently when the shaft *z*, which is attached to this crank-arm Z, is turned in one direction or the other by a speed-governor or otherwise, a corresponding change of the period when the transverse, lateral, or oscillating motion commences, relative to the longitudinal motion, takes place.

Valves and other devices have heretofore been operated by eccentrics placed in positions at right angles to their axes of rotation, and also by circular disks concentric with their axes of motion, but placed in an inclined or oblique position upon their shafts; but such are essentially different from our invention, inasmuch as in the latter eccentricity and an oblique position are so combined in a single disk that such single disk is enabled to provide movement in the requisite different directions in a direct and simple manner.

What we claim as our invention is—

1. A valve-gear mechanical movement comprising a shaft, in combination with an eccentric carried thereon and arranged at an angle or inclination thereto, substantially as and for the purpose herein set forth.

2. In a mechanical movement, the combination, with a shaft, of a movable inclined eccentric, and mechanism for varying the position of said eccentric, substantially as and for the purpose herein set forth.

3. In a mechanical movement, the combination, with a shaft, of a movable inclined eccentric, an independent crank, and mechanism connecting said crank and eccentric to vary and control the position of the inclined eccentric, substantially as and for the purpose herein set forth.

4. In a mechanical movement, the combination of the following elements, to wit: a shaft, a movable inclined eccentric carried by said shaft, a speed-governor, and mechanism for transmitting motion from said governor to said eccentric, substantially as and for the purpose herein set forth.

5. In a mechanical movement, the combination, with a shaft, of a movable inclined eccentric carried by said shaft, an independent crank, a lever or levers connecting said crank with said eccentric, a speed-governor, and mechanism connecting said governor with said crank, substantially as and for the purpose herein set forth.

6. In a mechanical movement, the combination, with a shaft, of a movable inclined eccentric carried by said shaft and provided with an arm, *l*, and an independent crank connected with the extremity of said arm, substantially as and for the purpose herein set forth.

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