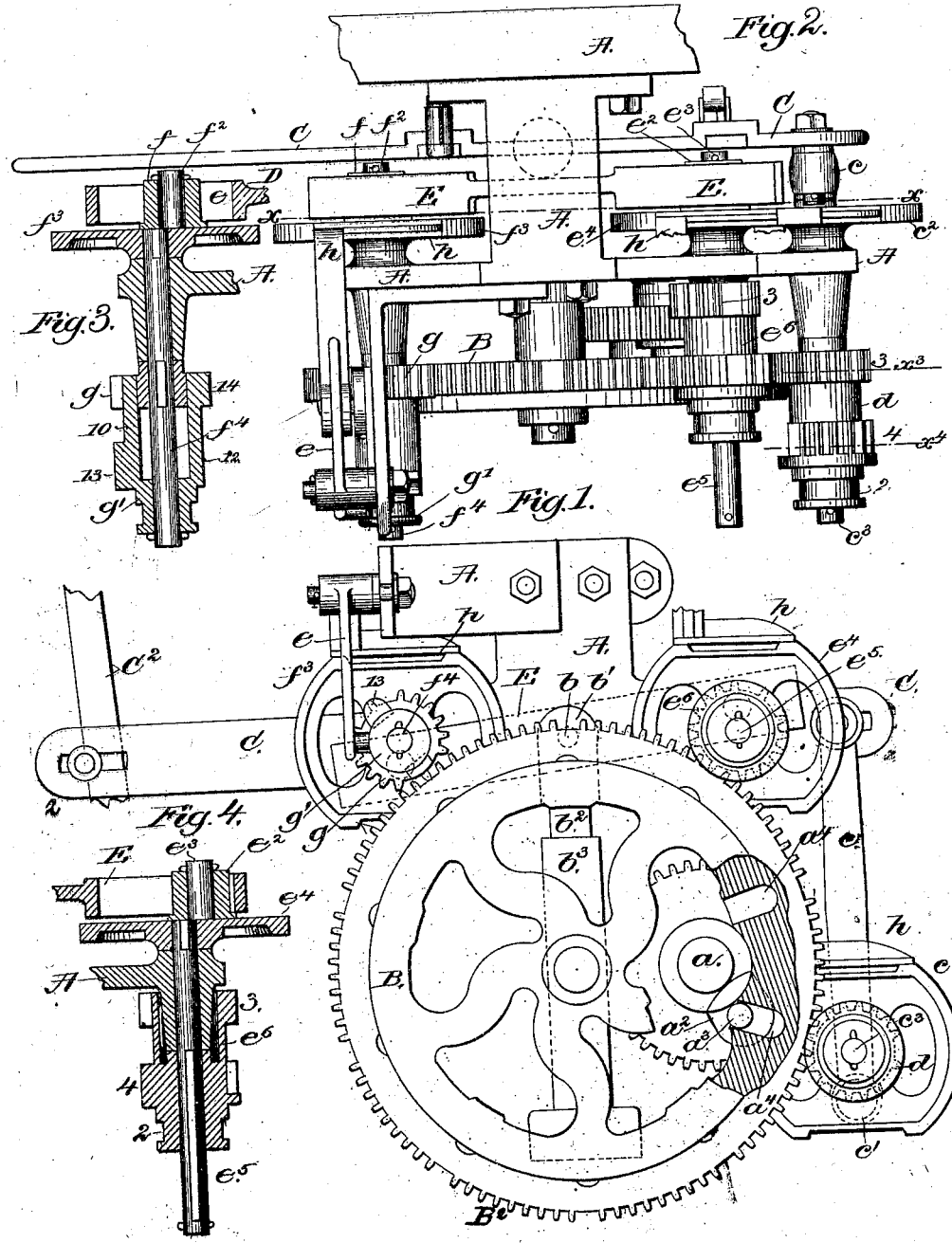
(No Model.) 3 Sheets—Sheet 1.

H. WYMAN.

MECHANISM FOR CONVERTING MOTION.

No. 260,349. Patented June 27, 1882.



Witnesses.
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by Crosby & Gregory Attys.

(No Model.) 3 Sheets—Sheet 2.

H. WYMAN.

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Fig. 5.

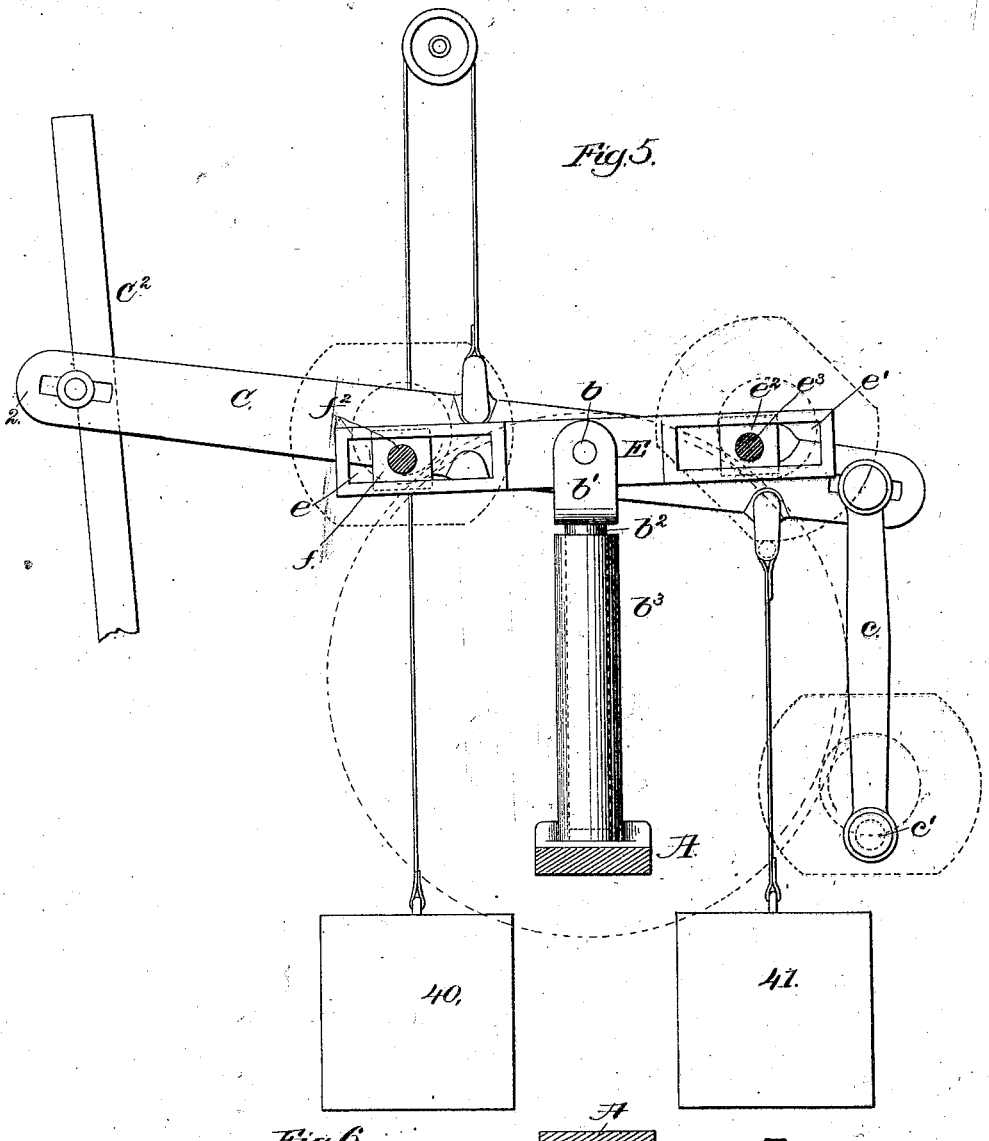
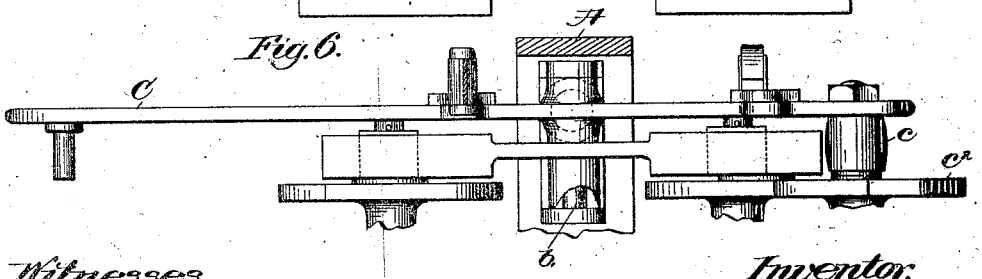


Fig. 6.



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(No Model.) 3 Sheets—Sheet 3.

H. WYMAN.

MECHANISM FOR CONVERTING MOTION.

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Fig. 7.

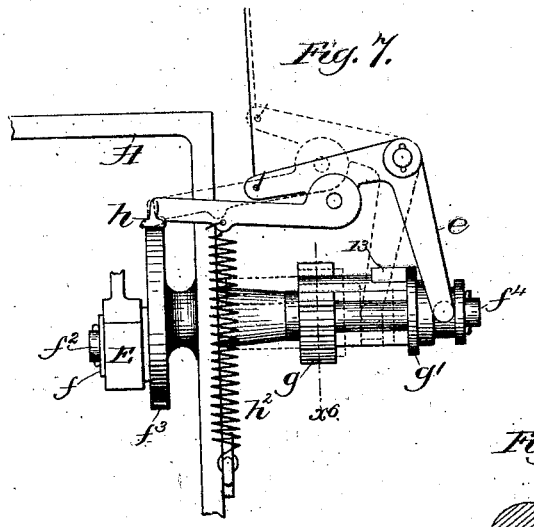


Fig. 8.

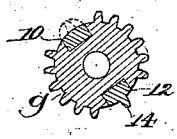


Fig. 9.

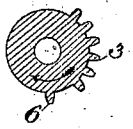


Fig. 10.

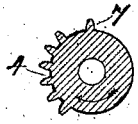
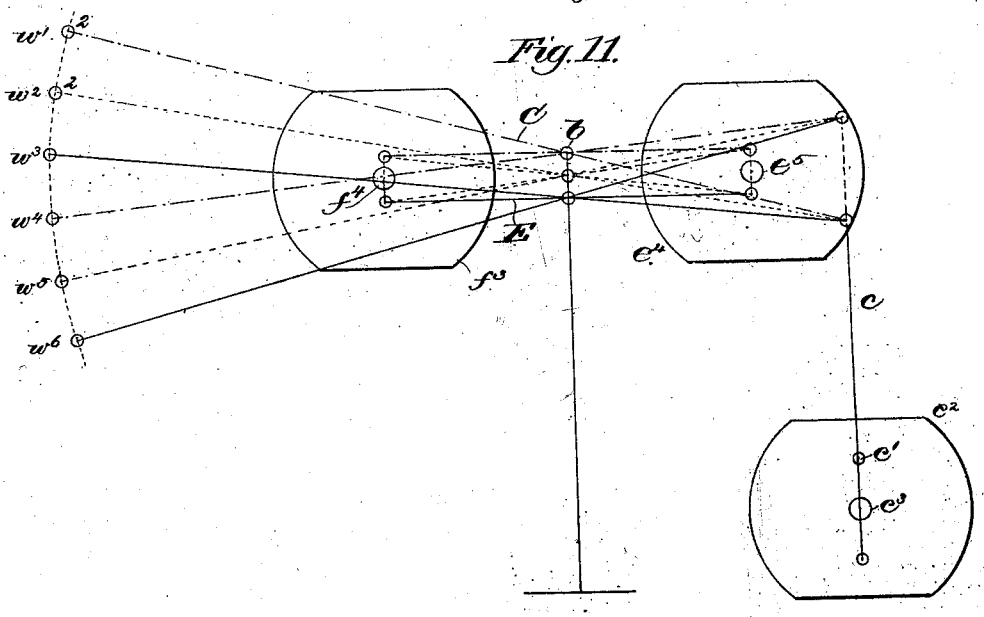


Fig. 11.



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UNITED STATES PATENT OFFICE.

HORACE WYMAN, OF WORCESTER, MASSACHUSETTS.

MECHANISM FOR CONVERTING MOTION.

SPECIFICATION forming part of Letters Patent No. 260,349, dated June 27, 1882.

Application filed May 4, 1882. (No model.)

To all whom it may concern:

Be it known that I, HORACE WYMAN, of the city and county of Worcester, State of Massachusetts, have invented an Improvement in Mechanism for Converting Motion, of which the following description, in connection with the accompanying drawings, is a specification.

This my invention has for its object to move a lever of the first order intermittingly over arcs of different lengths from a continuously-rotating shaft by the intervention of a series of cranks and actuating devices therefor; and my invention consists in a mechanical organization for such purpose, and in independent novel mechanical devices, forming part thereof, as will be hereinafter set forth and specified in the claims at the end of this specification.

Figure 1 represents in side elevation, partially broken out, a mechanical organization embodying my invention; Fig. 2, a top view thereof; Figs. 3 and 4, longitudinal sectional details of two novel semi-rotating gears employed in the said train of mechanism; Fig. 5, in full lines, a vertical sectional detail of Fig. 2 on the dotted line x, the frame-work above the levers being removed; Fig. 6, a top view of the parts shown in Fig. 5, with the addition, in full lines, of certain holding plates or devices, to be described; Fig. 7, a side elevation of one of my novel duplex semi-rotating gears, and the lever for moving the same longitudinally, and the holder to operate upon the disk of the shaft with which the said gear is keyed; Fig. 8, a cross-section of one of the duplex gears on the dotted lines x^6, Fig. 7; Figs. 9 and 10, sections of the toothed portions 3 4 of one of the duplex gears on dotted lines x^3 x^4, Fig. 1; Fig. 11, a diagram illustrative of the different movements or positions of the crank pins and levers.

The frame-work to support the different working parts is marked A. The source of motion is the main shaft a, which is rotated continuously. This shaft has an arm, a^2, provided with a pin, a^3, which engages slots a^4, formed within the master-gear B, the said arm, pin, and slots constituting a pin and star-wheel contrivance for moving the master-gear intermittingly. The periphery of the master-gear has a series of teeth with intervening spaces where the teeth are removed. Each series of teeth at the periphery of the master-gear, as herein shown, contains nine separate teeth; or, what would be the same, each tenth tooth of the master-gear is removed.

The lever C, a lever of the first order, the front end of which is to be moved at stated times in a longer or shorter arc, to thus reciprocate for a greater or less distance a rod, C^2, it may be, or other device connected therewith, for a greater or less distance at one movement and in the same interval of time, has its fulcrum on a pin, b, as herein shown, inserted through the forked upper end, b', of a rod, b^2, fitted loosely in and so as to rise and fall in a guiding-post, b^3. The rear end of this lever has attached to it a connecting-rod, c, the lower end of which is fitted to a crank-pin, c', (shown in dotted lines, Fig. 1,) fixed to the rear side of the disk c^2, fast upon the shaft c^3, having its bearings in the frame-work A. This shaft has splined upon it a novel partially-tubular duplex gear, d, (see Fig. 2,) which is adapted to be reciprocated on the said shaft by means of a suitable lever, e, shaped as shown in Fig. 7, which will be pivoted on the frame-work A, so that with its forked part embracing an annularly-grooved part of the said gear, the latter may be moved longitudinally on the shaft c^5, either by hand or by its connection with a lever or finger actuated by what is known as a "pattern-surface."

The gear d (see Fig. 2) has two toothed parts, 3 4, each of which is shown in section in Figs. 9 and 10, wherein it will be seen that the toothed part 3 has nearly one-half its teeth removed, leaving a series of six teeth and an isolated tooth, 6, near one end of the said series, and that the toothed part 4 has nearly one-half of its teeth omitted, leaving a series of six teeth and an isolated tooth, 7.

It will also be observed that the series of teeth of the part 3 is diametrically opposite the series of teeth of the part 4, and that the isolated teeth 6 7 are diametrically opposite with relation to the shaft c^3, which is rotated by the said gear d. When the gear d is moved so as to place the isolated tooth 6 in the path of the teeth B^2 of the master-gear B, the latter will engage the said tooth and the series of

six teeth at the rear of it, and rotate the said gear and the shaft c^3 half a rotation, to move the crank-pin c' from one to its other extreme position, by which time the teeth of the master-wheel and toothed portion 3, extended but partially about gear d, will run out of mesh, and the gear d will remain idle with the crank-pin c' at rest.

The crank-shafts c^3 e^5 f^4, arranged about the master-wheel B, have on them, respectively, the disks c^2 e^4 f^3, which have portions of their peripheries cut away at two sides, as shown in Fig. 1, and each disk has co-operating with it a holder, h, which holds each disk with sufficient force to prevent it and the shaft with which it is connected from being rotated, except when the gear on the said shaft is in engagement with the teeth of the master-gear B. One of these holders or brakes h is shown fully in Fig. 7, where it will be seen that the end of the brake-lever is pivoted upon the lever e, which moves the duplex gears. Each holder or brake will be held down by a spring, h^2. By moving the fulcrum-pin b of the lever C the latter may be raised and lowered without moving the crank-pin c', and by moving the fulcrum-pin and crank-pin c' in opposite or in the same directions the throw of the outer end, 2, of the lever C may be more or less increased, and the end of the said lever may be moved into any one of the positions w' w^2 w^3, &c., from any other of the said positions. The pin b of the lever C is extended through the central part of a lever, E, having slots e e' at its opposite ends. The slot e' receives a block, e^2, on a crank-pin, e^3, of the disk or plate e^4, fast on shaft e^5, the latter having on it a double gear, e^6, which is constructed just the same as the gear d, hereinbefore fully described. This gear e^6, when moved horizontally on the shaft e^5 by a lever like the lever e, Fig. 7, will have its toothed parts thrown into engagement with the master-gear B, and will be rotated half a revolution to carry the crank-pin e^2 from one to its other extreme position, when the said crank-pin and gear e^6 will be left at rest until after the gear shall be again moved horizontally on its shaft, as described of gear d, when the shaft and crank-pin will be again moved half a revolution. The crank-pin e^3 will raise and lower the end of the lever E, with which it is connected. The slot e receives the block f on the crank-pin f^2, carried by the disk f^3, secured to the shaft f^4. (See Fig. 3.)

The shaft f^4 has fixed to it a gear, g, having some of its teeth removed at diametrically-opposite points, as shown in Fig. 8, which is a section of Fig. 7 on the dotted line x^6. This gear is grooved where its teeth are omitted, and receives in the said grooves the arms 10 12 of a hub, g', keyed to slide on the said shaft f^4. The arms 10 12 of this hub have teeth 13 14 at different distances from the outer end of the hub g', the tooth 13 being nearer the end of the hub than the tooth 14, so that by sliding the said hub in one or the other direction the said teeth 13 14, which I call "sliding teeth," may be placed in working position with relation to the teeth of the gear g, fixed on the shaft f^4. If the tooth 14 is moved into line with the teeth of the gear g, as in full lines, Figs. 3 and 7, it will be engaged by the master-wheel and be turned half a revolution, when, by reason of the toothless space diametrically opposite tooth 14, the teeth of the master-gear will run out of mesh with the gear g, and the latter and the shaft f^4 and crank-pin f^2 will remain at rest until the hub g' is shifted laterally by the lever e, as in dotted lines, Fig. 7, so as to carry the tooth 14 away from the teeth of gear g and place tooth 13 in line with its teeth, when the teeth of the master-gear will engage it, as the first tooth, and again turn the gear g and shaft f^4 and crank-pin f^2 half a revolution. If both crank-pins f^2 and e^3 are simultaneously moved into their high points or their low points, both ends of lever E will be raised or lowered equal distances and will lift or depress the fulcrum-pin b of the lever C. If crank-pin f^2 is moved into its high point and crank-pin e^3 into its lowest position at the same time, the fulcrum-pin b will not be changed. The three crank-pins c^3, e^3, and f^2, when all are operated together to move the fulcrum-pin b and the outer end of the lever C in the same direction, will produce the maximum throw of the outer end of lever C, or from w' to w^6, Fig. 11. A semi-rotation of one of the said cranks while all the others remain at rest will give the minimum movement to the outer end of lever C, which is one-sixth that of the maximum, or from w' to w^2, so by turning the crank-pins to act all together, or in opposition, one or more to the other, the outer end of the lever C may be placed in any of the six positions, w', w^2, &c., Fig. 11.

To prevent the levers C and E from rocking or tipping, the sleeve b^2 is fitted into the guide b^3.

In case the lever or its attached rod C^2 has to carry a load, the weight of the load may be counterbalanced by the weights 40 41. (Shown in Fig. 5.)

I claim—

1. A horizontally-sliding duplex gear, d, having two series of teeth, and teeth 6 7, removed one or more spaces therefrom to constitute toothless or blank spaces, as described, and shaft c^3, upon which the said gear is splined to be reciprocated, combined with the rotating master-gear to operate the said duplex gear and shaft c^3 half a revolution at a time, substantially as described.

2. The master-gear combined with the crank-shaft and a gear thereon having isolated teeth, or teeth removed one or more spaces from the main series of teeth of the latter gear, either of which isolated teeth may be placed in position to be engaged by the teeth of the master-gear to partially rotate the said crank-shaft, substantially as described.

3. The shaft f^4 and the gear g thereon, combined with separate and independent teeth 13

14, adapted to be placed alternately in line with the teeth of gear *g* at suitable intervals, substantially as described.

4. The two pivoted levers C E, combined with the slide-rod b^2 and guide for it, to prevent the levers from tipping over, substantially as described.

5. The master-gear and two or more shafts having gears provided with two series of teeth, and with spaces next them from which the teeth have been removed, to permit the teeth of the master-gear to run out from mesh with and to subsequently engage the teeth of the said gear, substantially as described, and crank-pins carried by the said shafts, combined with levers connected with and actuated intermittingly by the said crank, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HORACE WYMAN.

Witnesses:
J. B. LYME,
J. A. WARE.