(No Model.)

A. HADSALL.

DEVICE FOR CONVERTING MOTION.

No. 604,826. Patented May 31, 1898.

Fig. 1.

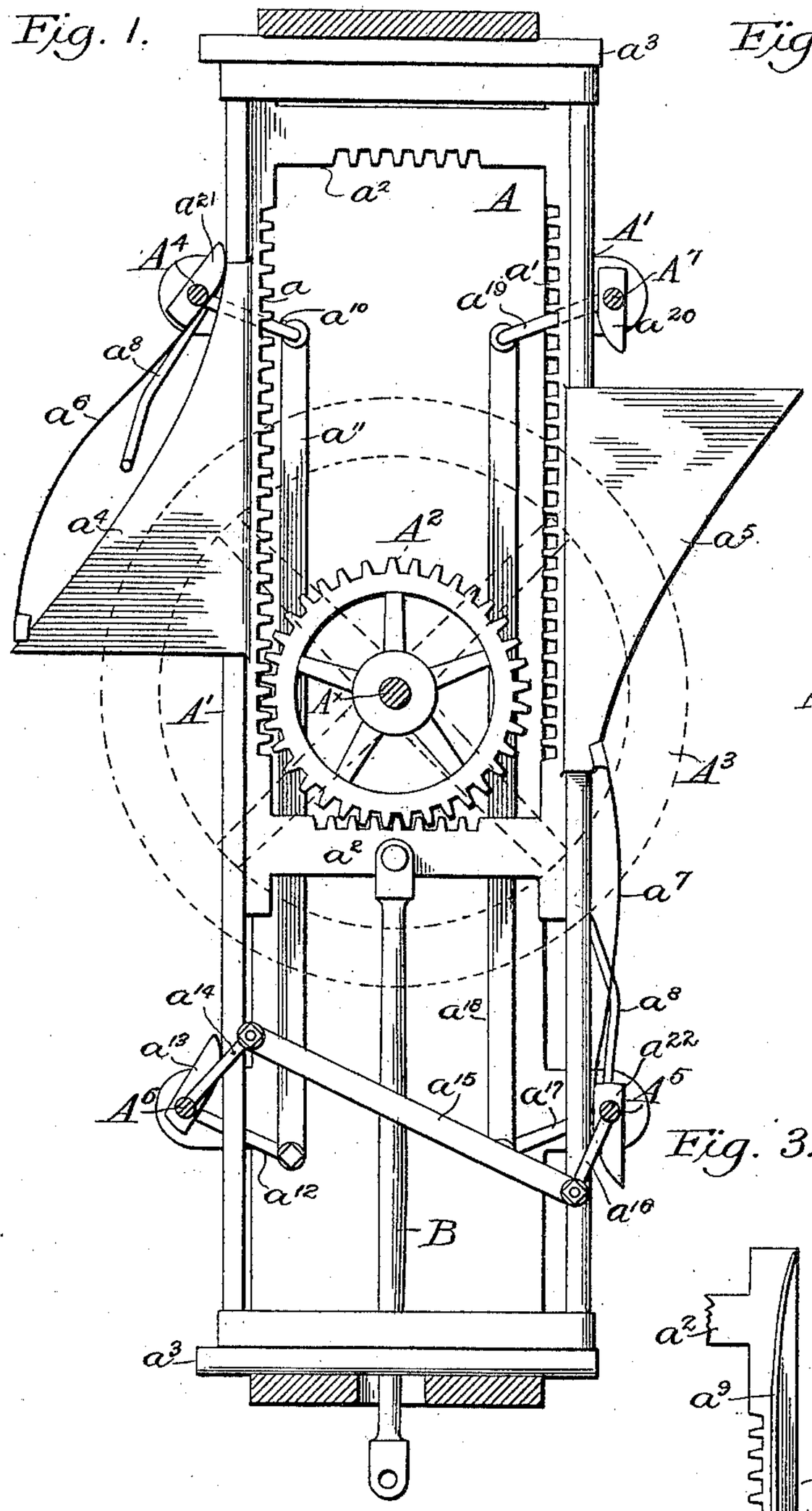


Fig. 2.

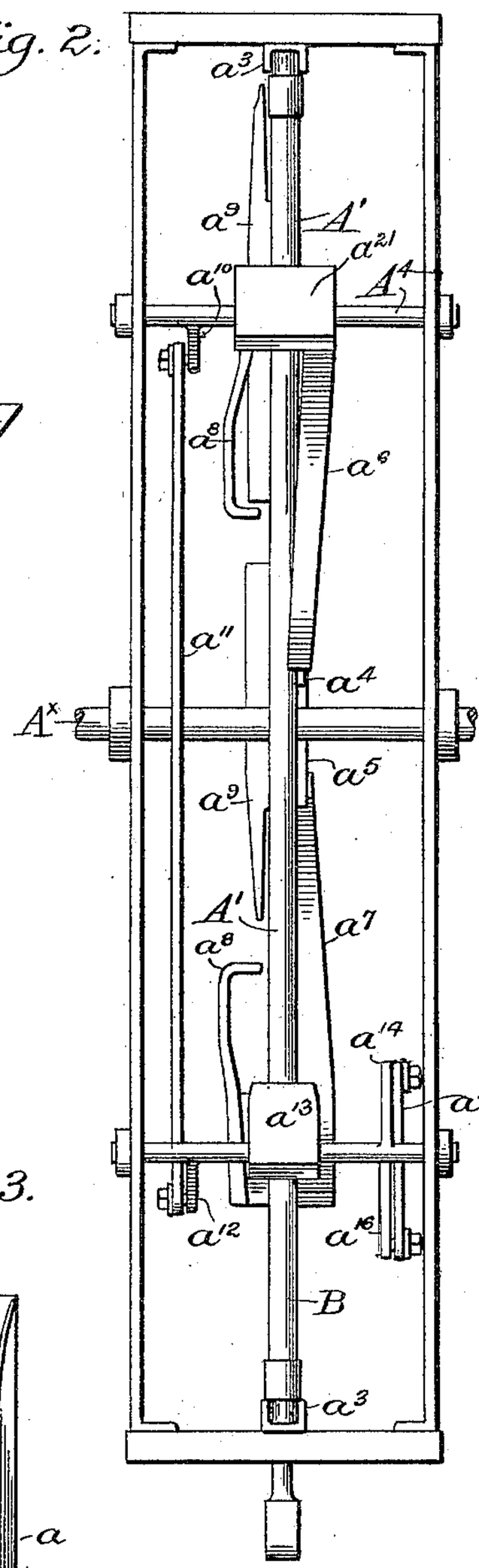
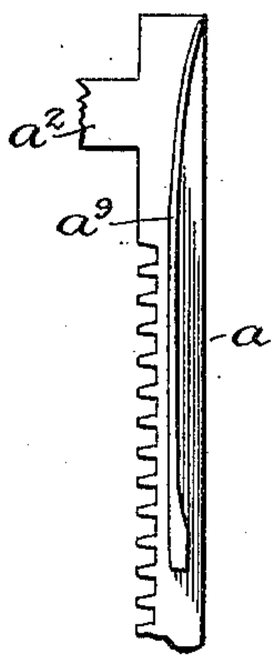


Fig. 3.



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UNITED STATES PATENT OFFICE.

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DEVICE FOR CONVERTING MOTION.

SPECIFICATION forming part of Letters Patent No. 604,826, dated May 31, 1898.

Application filed November 23, 1897. Serial No. 659,646. (No model.)

To all whom it may concern:

Be it known that I, AMOS HADSALL, a citizen of the United States, residing at Mapleton, in the county of Lane and State of Oregon, have invented certain new and useful Improvements in Devices for Converting Motion; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machine elements.

The object is to provide a mechanical movement of simple and inexpensive construction which may be used for various kinds of machinery and which by reason of the peculiar construction and operation of its parts will overcome the dead-centers incident to ordinary crank movements and in which the crank, wheel, or disk may be rotated in either direction.

With these objects in view the invention consists in the novel construction and combination of parts of a device for overcoming the loss of power in passing the dead-center and preventing dead-centering of a crank, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like letters of reference indicate corresponding parts, I have illustrated a form of embodiment of my invention, although it is to be understood that other forms may be employed without departing from the spirit of the same, and in the drawings—

Figure 1 is a view in side elevation with part of the casing or housing of the device removed in order to show its operative parts. Fig. 2 is a view in front elevation. Fig. 3 is a view of the rack-plates detached from the device, showing the different parts thereof.

Referring to the drawings, A designates a rectangular frame provided on the opposed inner edges of its sides with teeth, the sides constituting rack-bars a a', and with two end or stop plates a^2, also provided with teeth, the function of which will be described later on. This frame is mounted for longitudinal movement in two guides A′, which may be grooved for the purpose and for transverse or lateral movement in two end guides a^3, which may also be grooved for the purpose, as clearly shown in Fig. 2. The teeth of the rack-bars are designed alternately to be brought into engagement with a gear-wheel A^2, the shaft $A^\times$ of which projects outward through the frame of the machine and may carry a fly-wheel A^3, as indicated by dotted lines, or may carry a driving-pulley to be connected through the medium of an ordinary belt with a piece of machinery to be driven.

The mechanism for shifting the rack-bars laterally to cause them to operate the gear-wheel at each rotation of the connecting-rod or pitman B (which may be the connecting-rod of an engine) comprises two cam-plates a^4 a^5, secured to the rack-bars, the cam-plates being oppositely disposed—that is to say, their cam-surfaces extend in opposite directions.

Mounted upon each of two shafts A^4 and A^5 on diagonally opposite sides of the frame is a rack-shifting spring a^6 a^7, the free end of each of which is provided with a guide to work upon the cam-surfaces of the plates a^4 a^5, and for the purpose of preventing undue wear of the cam-surfaces these guides may each be provided with a grooved sheave. Upon each of the shafts A^4 A^5 is also secured a spring-retaining arm a^8, which as the frame is reciprocated in one direction is adapted to slide under a fin a^9, carried by the side of the rack-bar opposite that to which the cam-plate is secured. These arms a^8 will operate alternately to hold the guides of the springs a^6 a^7 close against the surface of the cams, and as the frame is reciprocated backward or forward, as the case may be, will by causing the guides closely to hug the cam-surfaces put the springs under such tension that when the arm reaches the end of the fin and escapes the springs will alternately rapidly force the frame to one side, thus bringing the teeth of one of the rack-bars alternately into engagement with the teeth of the gear-wheel A^2 and shifting the teeth of the other rack-bar out of engagement with the gear-wheel. The shaft A^4 also carries a crank a^{10}, to which is attached one end of a link a^{11}, the opposite end of which is attached to a crank a^{12}, rigidly connected with a shaft A^6. The shaft A^6 carries a dog a^{13}, as clearly shown in Fig. 1, which when the gear-wheel A^2 is in

mesh with the rack-bar a bears against the outer edge of the frame on that side, so that when the rack-shifting spring a^6 is released by the arm a^8 the link a^{11} will, through the partial rotation of the shaft A^4 and the cranks a^{10} and a^{12}, be shifted longitudinally, and thereby depress the dog a^{13} and cause it to shift the frame laterally to bring the teeth of the rack-bar a' into engagement with the gear-wheel A^2. The shaft A^6 carries near the end opposite that to which the crank a^{12} is mounted a second crank a^{14}, and to this latter crank is loosely connected one end of a link a^{15}, the opposite end of which is loosely connected with a crank a^{16}, carried by the shaft A^5. Carried by the shaft A^5, opposite the end on which the crank a^{16} is arranged, is a crank a^{17}, to which is loosely connected one end of a link a^{18}, the opposite end of which is loosely connected with a crank a^{19}, carried by a shaft A^7, mounted opposite the shaft A^4.

It will be seen that when the spring a^6 is released by the arm a^8 and the dog a^{13} shifts the frame laterally the link a^{15} will be moved to one side, and thereby rock the shaft A^5 and bring the rack-shifting spring a^7 into engagement with the cam a^5, while at the same time, through the agency of the crank a^{17}, link a^{18}, and crank a^{19}, the shaft A^7 will be rocked, thereby bringing a dog a^{20}, carried by the shaft A^7, into engagement with the rack-frame, in which position it is held to shift the frame again to one side, when the rack-shifting spring a^7 has been released by the escape of the arm a^8 from the fin a^9. To cause both ends of the frame to be shifted laterally in unison and thereby obviate any danger of the frame binding in the guides a^3, the shafts A^4 and A^5 are each provided with a dog a^{21}, a^{22}, respectively, which operate in precisely the same manner as the dogs a^{13} a^{20}, so that at each release of a spring a^6 or a^7 pressure will be applied simultaneously to both ends of the frame, and thereby effect its proper lateral shifting.

The movements of this device are very rapid and are accurately timed, so that there is no lost motion, and as soon as the piston or pitman has reached the limit of one stroke the mechanism for shifting the rack-plate is automatically brought into operation to bring the rack-bar on the opposite side into engagement. Furthermore, there is no loss of power in passing the centers and all danger of catching on dead-centers when stopping and starting is entirely obviated.

To cause the teeth of the rack-bars accurately to register with the teeth of the gear-wheel, so that all danger of riding or non-meshing of the teeth will be obviated, the teeth of the stop-plates a^2 are designed to engage with the teeth of the gear-wheel at the limit of each stroke and just before the rack-frame is shifted.

The device thus far described is designed to rotate the drive-shaft only in one direction; but it will be seen that it will only be necessary to provide two extra cam-plates and two extra rack-shifting springs, so that one set may be brought into operation and the other one shifted, whereby to produce a device that may be made to run in either direction.

Instead of employing the form of rack-shifting springs shown a bar may be substituted for the spring, and a coiled spring secured to one end of the bar and to a fixed part of the casing may be used to cause the bar to perform its proper function.

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

1. In a device of the character specified, the combination with a gear-wheel and two rack-bars adapted alternately to operate the same, of automatically-operating shifting mechanism comprising, in part, cam-plates secured to the rack-bars, springs exerting lateral pressure on the cams, and means comprising a spring-retaining arm and a fin engaged thereby for holding the springs under requisite tension until a full stroke of the rack-bars has been completed, substantially as described.

2. In a device of the character specified, the combination with a gear-wheel, of two rack-bars mounted for reciprocatory motion and adapted to be shifted laterally, of means for bringing alternate rack-bars into engagement with the gear-wheel at the termination of each stroke, comprising two cam-plates, one mounted on each of the rack-bars, two shafts each carrying a spring in engagement with the cam-plate, and an arm, a fin also carried by each rack-bar with which the arm engages to hold the spring under requisite tension, two shafts, each carrying a dog adapted to bear upon the rack-bar frame on opposite sides thereof, and links connecting, through the medium of arms, with the respective shafts, substantially as described.

3. In a device of the character specified, the combination with a gear-wheel, of two rack-bars mounted for reciprocatory and lateral motion with relation to the gear-wheel, a cam-plate carried by each rack-bar, a spring, and mechanism for holding the same under requisite tension to effect lateral shifting of the rack-bars, and means for effecting accurate meshing between the respective rack-bars and the gear-wheel at the end of each stroke, comprising a toothed stop-plate arranged at each end of the rack-bar-carrying frame, and with which the teeth of the gear-wheel engage at the limit of each stroke, substantially as described.

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

AMOS HADSALL.

Witnesses:
J. S. MEDLEY,
F. E. GOODMAN.