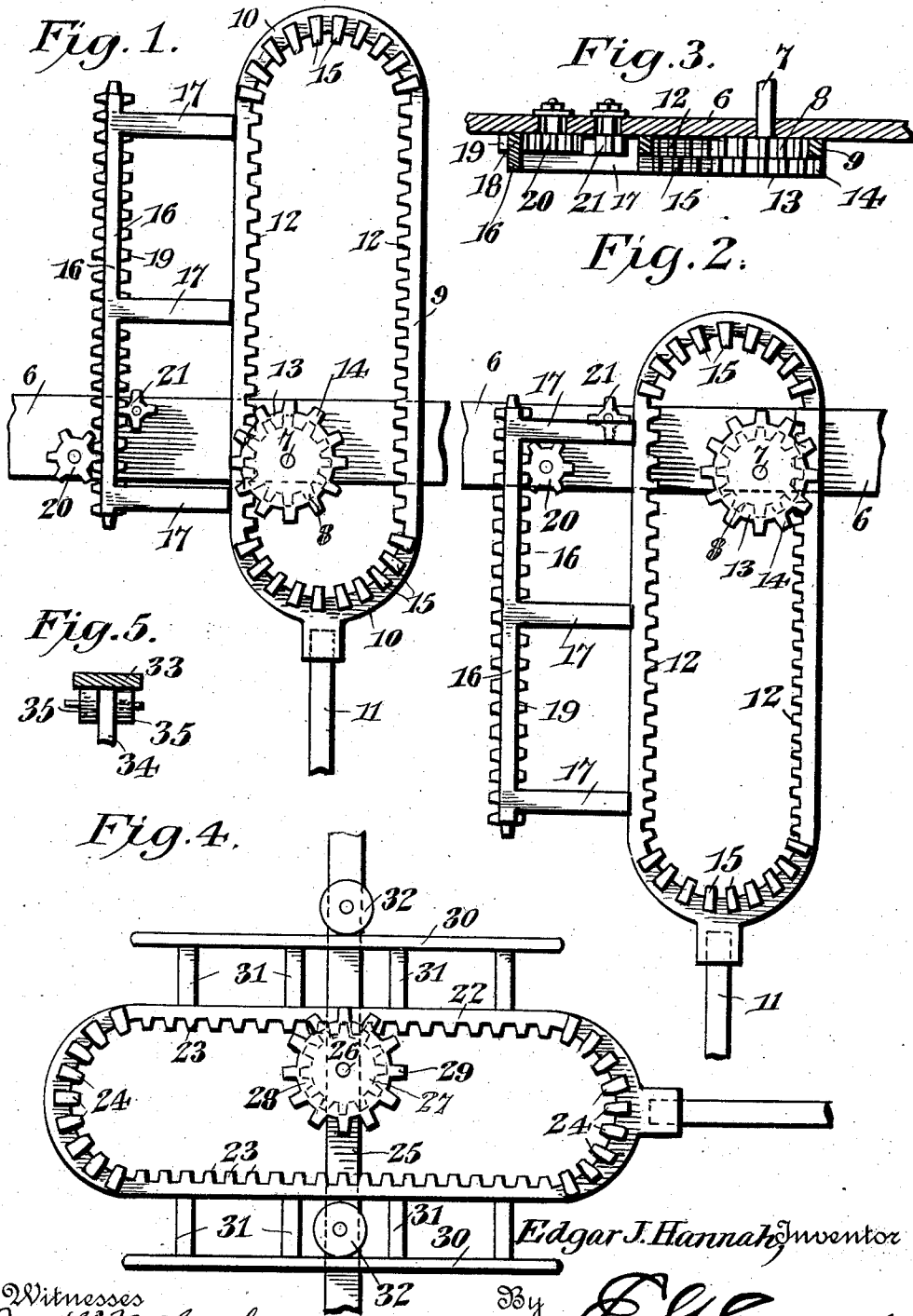


No. 850,930.

PATENTED APR. 23, 1907.

E. J. HANNAH.  
MECHANICAL MOVEMENT.  
APPLICATION FILED NOV. 22, 1905.



Edgar J. Hannah, Inventor

Witnesses  
Jas. K. McEachran  
Bl. Foster

By  
E. J. Figger  
Attorney

# UNITED STATES PATENT OFFICE.

EDGAR J. HANNAH, OF GREEN CASTLE, MISSOURI.

## MECHANICAL MOVEMENT.

No. 850,930.

Specification of Letters Patent.

Patented April 23, 1907.

Application filed November 22, 1905. Serial No. 288,555.

To all whom it may concern:

Be it known that I, EDGAR J. HANNAH, a citizen of the United States, residing at Green Castle, in the county of Sullivan and State of Missouri, have invented a new and useful Mechanical Movement, of which the following is a specification.

This invention relates to means for converting rotary into reciprocatory motion. Certain of these devices of which I am aware are objectionable and defective in view of the fact that cams are employed on the drive-gear that engage with rollers located on the yoke, so that the leverage is increased against the gear or power from the center or axis of movement thereof to the pitch-line of the teeth on the wheel and to the outer edge of the cam, necessitating greater driving power while the cam is engaged and causing an uneven motion as well as irregular power. Another objection to the employment of a cam-pinion is that the length of the stroke of the piston is limited. This will be apparent when it is considered that a multiple of teeth on the yoke must be a multiple of teeth on the driving gear or pinion, so that different lengths of stroke with any-sized pinion is not permitted.

One of the principal objects of the present invention is to provide a mechanical movement of the above character in which any length of stroke required may be obtained without increasing the leverage against the driving-pinion from the axis of the same to the pitch-line of the teeth, and, furthermore, to provide mechanism that will give any length of stroke desired independently of the size of the driving-gear or number of teeth thereon or on the yoke.

Two embodiments of the invention are disclosed in the accompanying drawings; but it will be apparent upon an inspection of the appended claims that said invention is not limited solely to the forms set forth.

In the drawings, Figure 1 is a side elevation of a simple form of the invention, showing the parts in one position and with the yoke in engagement with one side of the wheel. Fig. 2 is a similar view, but showing the opposite side of the yoke cooperating with the wheel. Fig. 3 is a cross-sectional view through the structure. Fig. 4 is a view in elevation of another embodiment of the invention. Fig.

5 is a detail cross-sectional view illustrating the use of two guide-rollers.

Similar reference-numerals designate corresponding parts in all the figures of the drawings.

In the embodiment of the invention illustrated in Figs. 1, 2, and 3 a suitable support 6 is shown, in which is journaled a drive-shaft 7, carrying a driving-pinion or gear-wheel 8. This gear-wheel is surrounded by a yoke 9, having substantially straight sides and curved ends 10, to either or both of which may be attached a plunger, piston, or other rod, as 11. Teeth 12 are formed upon the inner side of the yoke and cooperate with the teeth of the gear-wheel 8. Said gear-wheel 8 has a flange portion 13, which overlies the outer face of the yoke and is provided with peripheral teeth 14. These teeth cooperate with curved sets of teeth 15, located at the ends of the yoke.

Carried by the yoke and disposed longitudinally thereof at one side of the same is a guide-bar 16, disposed in spaced relation to said yoke and connected thereto by arms 17. This guide-bar is provided with a flange portion 18, located on the inner side of the same and at one side of the arm 17, said flange portion having teeth 19 around its outer side, forming a rack. Spaced guide-rollers 20 and 21 are journaled on the support 6 and have teeth which cooperate with the teeth 19 of the rack. The axes of movement of the rollers 20 and 21 and of the gear-wheel 8 are disposed in different planes, or, in other words, the rollers and wheel are out of alinement, the guide being arranged to pass between the rollers and completely around the roller 20.

In operation as the gear-wheel rotates the teeth thereof, engaging the teeth 12 of the yoke at one side, will effect the movement of said yoke in one direction. As the yoke reaches its limit of movement the said gear-wheel will engage the teeth at the end thereof, and at the same time the teeth 14 of the flange portion will engage the teeth 15. Therefore the yoke will be moved laterally. At the same time the guide will pass around the guide-roller 20, and consequently the opposite side of the yoke will be brought into engagement with the opposite side of the driving-gear. It will be held in this position by the guide-roller 20 until the opposite end

of the stroke is reached, whereupon the yoke will again move laterally to the originally-engaged side. It will thus be seen that very simple means are provided whereby the rotary movement of the driving-gear is transformed into reciprocatory motion imparted to the piston or other rod 11. Furthermore, this movement is regular, and there is no additional power required in the change at the ends of the stroke. The outer guide-roller 20 is preferably placed in substantially horizontal alinement with the driving gear-wheel. The inner roller is preferably placed above the center line, so that it will hold the guide in line until said guide has reached its highest point and is ready to pass over the outer roller. This roller holds the gear in mesh and prevents the flange of the driving-gear from carrying or taking weight from the inner or pinion teeth. The guide-rollers are preferably, though not necessarily, adjustable. It is also to be observed that in this structure the driving-wheel may be of any size found desirable or necessary in so far as the number of teeth is concerned, for said teeth need not be a multiple of the teeth of the yoke. The structure, moreover, is simple and economical, and the parts are of such a character that they are not liable to become deranged.

While the invention is peculiarly adapted for windmills, pumping mechanism, and the like, its usefulness is not limited to these various machines, but can be advantageously employed in practically any mechanism where it is desired to convert rotary into reciprocatory motion.

The structure may also be modified in a number of ways. For example, the teeth of the guides may be dispensed with, and a plurality of said guides can be employed on each yoke. As an instance of this attention is invited to Fig. 4, wherein a horizontally-movable yoke is shown and is designated 22. This yoke is provided with the usual inner teeth 23 and the end series of teeth 24. A support 25 has journaled thereon a driving-shaft 26, carrying a pinion 27, that operates on the teeth 23, and has a flange portion 28, overlying the yoke and provided with teeth 29, coacting with the teeth 24. Untoothed or smooth flanged guides 30 are located longitudinally along the opposite sides of the yoke and are connected thereto by arms 31. Coöperating with each of these guides is a swinging roller 32, journaled on the support, said guides traveling around the roller, as will be understood. In particularly heavy work two corresponding guide-rollers may be employed for each guide, as shown in Fig. 5, wherein the guide is designated 33 and is flanged on opposite sides of the arms 34. Rollers 35 operate on the flanged portions and are spaced apart

sufficiently to permit the passage of the arms. For lighter work the outer teeth at the ends of the yoke may be dispensed with.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

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

1. In a mechanical movement of the character described, the combination with a supporting member, of a yoke member having teeth on its inner side, a pinion coacting with the teeth, a guide carried by one member and having teeth on its opposite sides, and a pinion carried by the other member and meshing with the teeth of the guide, said guide and pinion being movable one around the other.

2. In a mechanical movement of the character described, the combination with a yoke having teeth on its inner side, of a gear-wheel located in the yoke, and coöperating with the teeth thereof, a guide connected to the yoke and having teeth on its outer side, and a toothed roller coöperating with the guide, said guide passing around the roller.

3. In a mechanical movement of the character described, the combination with a yoke having teeth on its inner side, of a gear-wheel located in the yoke and coöperating with the teeth thereof, a guide-bar located alongside the yoke and connected thereto, said bar having teeth around its outer sides, and a toothed roller coöperating with the guide, said guide passing around the roller.

4. In a mechanical movement of the character described, the combination with a yoke having teeth on its inner side, of a gear-wheel coöperating with the teeth, spaced rollers located alongside of the yoke and out of alinement with the gear-wheel, a guide located longitudinally along one side of and in spaced relation to the yoke, said guide having connections with the yoke and having a path of movement between the rollers and completely around one of the same.

5. In a mechanical movement of the character described, the combination with a yoke having teeth, of a gear-wheel operating on the teeth and having a flange portion overlying the yoke, said flange portion having teeth, and teeth located at the ends of the yoke and coöperating with the flange-teeth.

6. In a mechanical movement of the character described, the combination with a

yoke having teeth on its inner side, of a  
guide-bar located longitudinally along one  
side of the yoke and having connections  
therewith, said guide-bar having teeth,  
5 toothed rollers cooperating with the guide-  
bar, said bar moving between the rollers  
and completely around the same, a flange  
carried by the gear-wheel and overlying por-  
tions of the yoke, said flange having teeth,

and teeth located at the ends of the yoke 10  
and cooperating with the flange-teeth.

In testimony that I claim the foregoing as  
my own I have hereto affixed my signature  
in the presence of two witnesses.

EDGAR J. HANNAH.

Witnesses:

W. H. CRUMP,  
J. C. CUSTER.