W. T. SEARS.

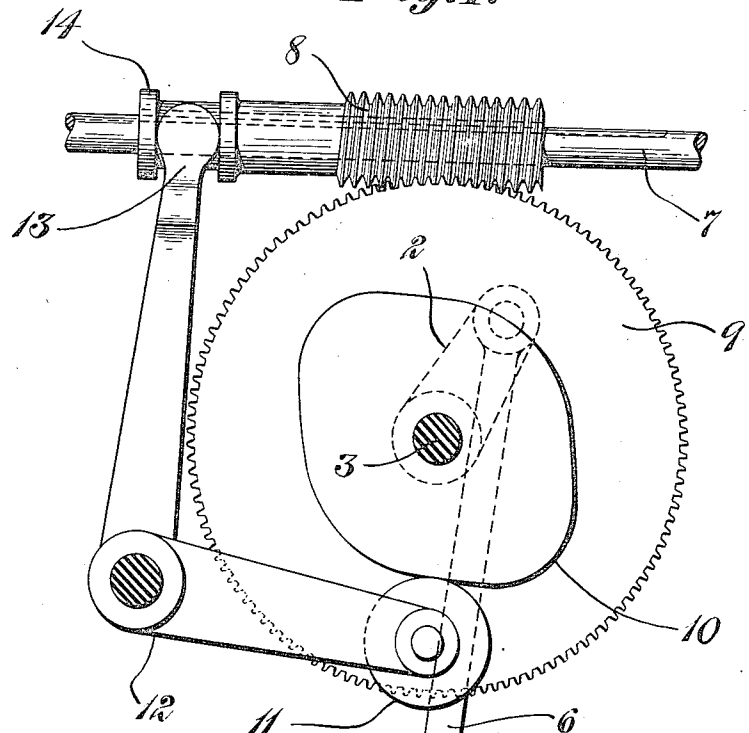
MECHANICAL MOVEMENT.

APPLICATION FILED NOV. 20, 1912.

1,087,558.

Patented Feb. 17, 1914.

Fig. 1.



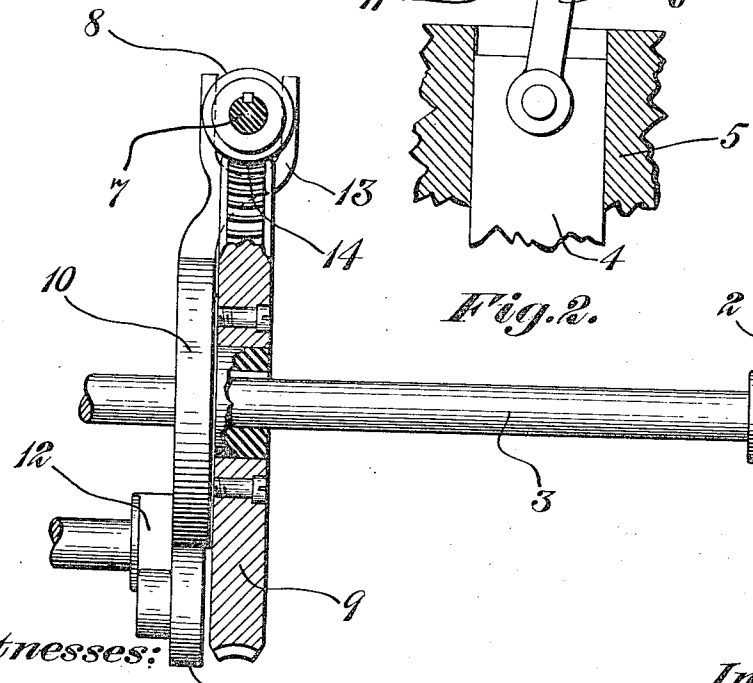


Fig. 2.

Witnesses:

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Inventor:
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UNITED STATES PATENT OFFICE.

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MECHANICAL MOVEMENT.

1,087,558. Specification of Letters Patent. Patented Feb. 17, 1914.

Application filed November 20, 1912. Serial No. 732,450.

To all whom it may concern:

Be it known that I, WILLARD T. SEARS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Mechanical Movements, of which the following is a specification.

This invention relates to mechanical movements, one of the primary objects thereof being to provide effective means by which a crank can be so driven as to insure uniform speed of a device operable thereby. Such a crank can be employed with advantage in a variety of different ways, for example for reciprocating a member, and when so utilized the crank-operable part of whatever nature it may be, will have a uniform speed for the major part of its movement, or at least for a predetermined period.

In the drawings accompanying and forming part of the present specification I have shown in detail one of these several convenient forms of embodiment of the invention, which to enable those skilled in the art to practise the same will be fully set forth in the following description. I do not restrict myself to this disclosure; I may depart therefrom in several respects within the scope of the invention defined by the claims following said description.

Referring to said drawings: Figure 1 is a side elevation of a mechanical movement embodying my invention. Fig. 2 is a view as seen from the right in Fig. 1, partly in section and omitting the slide.

Like characters refer to like parts throughout the several figures of the drawings.

It is a fact that a crank motion is desirable in certain connections. It has, however, one well-recognized defect when used for certain purposes, for example for reciprocating a part, in that the motion of the reciprocatory part is variable. I provide mechanism for revolving a crank having as a part thereof, means for varying the speed of said crank during a predetermined period or periods of its action, to thereby obtain uniformity in speed of the driven part which as already intimated may be of any desirable nature.

The numeral 2 denotes a crank which as shown, consists of an arm fastened to the shaft 3, so that as the shaft rotates the crank will be revolved to transfer its effect to some suitable part, which for illustration may be the slide 4 supported by the framing 5 and connected by the link 6 with said crank. A power-shaft as 7 is adapted to transfer through suitable means, as by gearing, its effect to the shaft 3 for rotating the same. As represented the shaft 7 has splined thereto for longitudinal movement thereon and rotation therewith, the worm 8 in mesh with the worm gear 9 keyed or otherwise suitably fastened to the shaft 3, so that on the rotation of the shaft 7 the shaft 3, through the intermediate described gearing will be turned simultaneously therewith to thus revolve the crank 2 and by the rod or link 6, reciprocate the slide 4. As will hereinafter appear the worm 8 in addition to its rotary movement is given a movement in the direction of its axis of rotation preferably at points that coincide with those at which the part 4 driven by the crank 2, would tend to change speed. In the present instance the crank 2 is successively accelerated and retarded in speed, by corresponding changes in velocity of the worm gear 9 through the action of worm 8 as will hereinafter appear, the increase in velocity of the crank commencing practically contemporaneously with that at which the decrease in speed of the slide 4 commences, while the decrease in velocity of the crank occurs substantially simultaneously with that at which the increase of velocity of said slide commences were the modifying or speed varying means not present, the result being uniformity in speed of the slide 4 or equivalent element.

It will be clear that I do not limit myself to any particular type of speed modifying means by which the crank is driven at variable speed the invention not residing in any particular mechanism for securing this function but rather in the broad feature of operating a crank at variable speeds by which uniformity in velocity of a member driven thereby is possible, the construction in the present case being such that the crank is operated at accelerated and retarded velocities in sequence in order to secure uniformity in speed of the driven member. There may be cases where such uniformity may be desired simply on one stroke or a part of one stroke of the driven part, for example it may be desirable to advance the slide at a uniform speed, while the nature of its return is not essential or the reverse might be the case.

By the present organization the slide 4 is given in theory a uniform reciprocation; I say "in theory" as there is a natural slowing down of the slide at the ends of the strokes thereof. This slowing down, however, is inappreciable, the uniformity in speed being present for approximately the major part of the movement of the slide or equivalent element.

The shaft 3 is shown having fastened to it a double-lobed cam 10, active against a stud or projection (shown as an anti-friction roller 11) on one branch of the lever 12 which as illustrated is of angle type, although this is an unimportant matter. The other branch of said lever 12 has a fork 13 the branches of which fit a peripheral groove in the collar 14 on the plain portion of the worm 8. It will, therefore, be clear that as the lever 12 is rocked, the worm will be moved in an endwise direction. The worm 8 owing to the fact that it is capable of endwise movement on the shaft 7 tends to maintain by reaction, the stud or anti-friction roller 11 solidly in contact with the periphery of the cam 10 so that the lever 12 can be rocked through the primary agency of said cam, without the necessity of employing a spring. The lobes of the cam are of duplicate construction and just about the time the crank 2 enters that part of its revolution which would tend under ordinary conditions to reduce the speed of the slide 4, the active portion of one of these lobes will engage the anti-friction roller 11 thereby through the intermediate parts, thrusting the worm 8 to the right and accelerating the movement of the worm gear 9 and crank 2 and slide 4 in practically exact proportion to the extent at which the slide would be progressively slowed down, the consequence being uniformity of speed of the slide during this particular period of revolution of the crank. After the high part of the lobe has passed off said roller 11, there would be a tendency for the slide to be progressively accelerated, the crank arm at this time having entered another period of its movement, and during this latter period the roller 11 will ride down the lobe of said cam and thus allow retraction of the worm 8 and thereby retard the rotation of the worm gear 9 and hence the crank arm 2, the retardation in speed of the worm gear 9 and the crank arm being contemporaneous with what would be the increase in speed of the slide were not the speed modifying means present. The crank arm 2, therefore, is progressively accelerated and progressively retarded at different or successive periods of its revolution.

What I claim is:

1. A mechanical movement comprising a crank, a gear connected with said crank, a second gear in mesh with the first gear, and mechanism for rotating said second gear and for also reciprocating the same in the direction of its axis of rotation to vary the speed of the first gear.

2. A mechanical movement comprising a crank, a gear connected with said crank, and mechanism for progressively increasing and then progressively decreasing the speed of rotation of said gear in at least two stages of each on each rotation of said gear whereby the crank will be correspondingly operated.

3. A mechanical movement comprising a crank, a worm gear connected with said crank, a worm in mesh with said worm gear, and mechanism for rotating said worm and for also giving the same two reciprocations, during each rotation of the worm gear.

4. A mechanical movement comprising a crank, a worm gear connected with said crank, a worm in mesh with said worm gear, mechanism for rotating said worm, and mechanism including cam means, for reciprocating said worm during each complete rotation of the worm gear.

5. A mechanical movement comprising a crank, a worm connected with said crank, a worm in mesh with said worm gear, and mechanism for rotating the worm and for also reciprocating the same at least once during each rotation of said worm gear.

6. A mechanical movement comprising a crank, a shaft to which said crank is rigidly connected, a cam and a worm gear both fastened to said shaft, a rotary worm in mesh with said worm gear, said worm being also mounted for movement in the direction of its axis of rotation, and a lever connected with said worm gear for reciprocating the same, the cam being adapted to act against said lever to effect therethrough, the reciprocation of said worm, at least once during each rotation of said worm gear.

7. The combination of a worm gear, a cam rotative with said worm gear, a crank arm revoluble by said worm gear, a worm in mesh with said worm gear, mounted for movement in the direction of its axis of rotation, and a device active against said worm for reciprocating the same, said cam being shaped to effect through said device, at least two reciprocations of said worm during each rotation of said worm gear.

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

WILLARD T. SEARS.

Witnesses:
W. M. STORRS,
HEATH SUTHERLAND.