C. H. GILL.

MECHANICAL MOVEMENT.

APPLICATION FILED DEC. 29, 1920.

1,413,982. **Patented Apr. 25, 1922.**

Fig. 1.

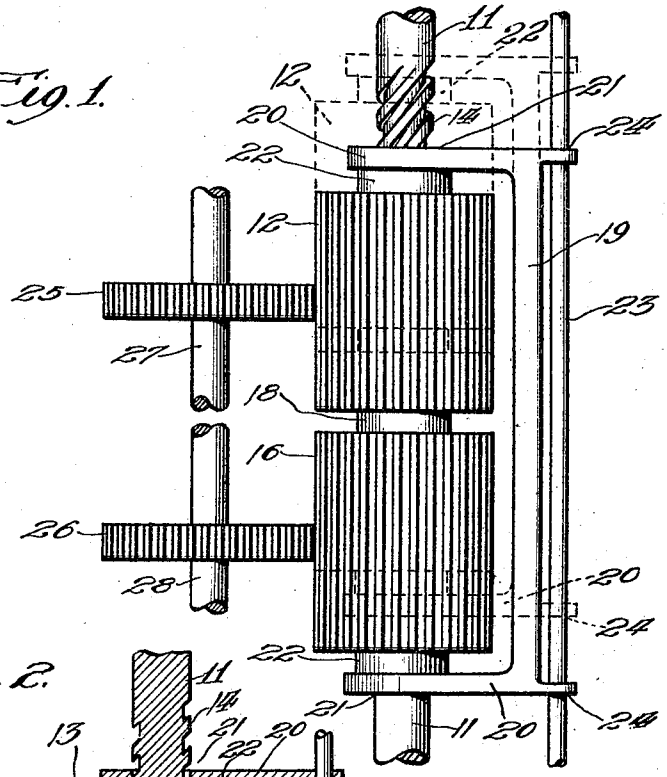


Fig. 2.

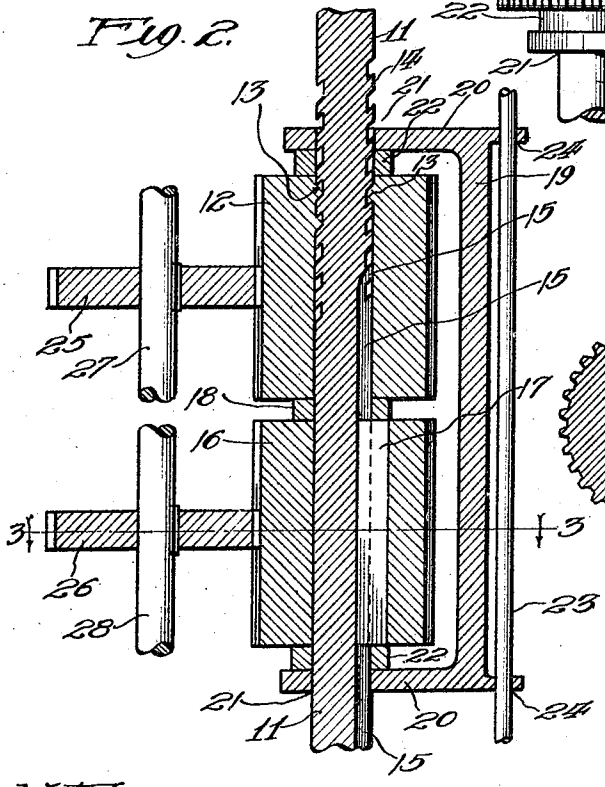
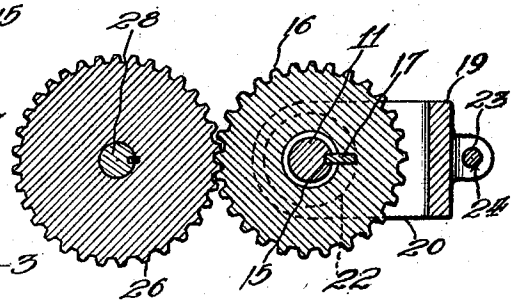


Fig. 3.



Witness:

Stephen V. Rebora

Inventor:

Charles H. Gill

UNITED STATES PATENT OFFICE.

CHARLES H. GILL, OF CHICAGO, ILLINOIS.

MECHANICAL MOVEMENT.

1,413,982. Specification of Letters Patent. Patented Apr. 25, 1922.

Application filed December 29, 1920. Serial No. 433,931.

To all whom it may concern:

Be it known that I, CHARLES H. GILL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Mechanical Movement, of which the following is a specification.

My invention relates to a novel association of parts adapted to perform various mechanical functions that have heretofore either been unprovided for or have been performed by less effective or more complicated aggregations of parts.

My invention has for its objects, first, the provision of means for detecting variations in the rotational speeds with respect to each other of two independently rotating elements; second, the provision of means whereby indication will be given as to which of the two rotating elements is rotating faster and which slower than the other; third, the provision of means whereby the extent and duration of the variation of rotational speeds of the two elements with respect to each other may be indicated; fourth, the provision of means whereby an element may be moved longitudinally upon a shaft in either direction by the movements of either of two independently movable parts, both of which are continuously engaged with the said element, and without the movement of either of said independently movable parts effecting any movement of the other of said independently movable parts; fifth, the provision of means whereby two elements rotating in opposite directions and maintained in fixed spaced relation to each other may be either moved longitudinally of a shaft a distance twice as great as they would be moved by the rotation of only one of the said elements at the same rotational speed or the shaft may be moved a like distance while the said elements are restrained from longitudinal movement on said shaft; sixth, the provision of means whereby two independently rotated elements upon the same shaft may be caused to approach each other or recede from each other as their speeds of rotation vary from each other; and, seventh, to provide means whereby two elements upon the same shaft, when rotated in opposite directions, will either approach each other or recede from each other at speeds proportional to and with power proportional to the sums of the speeds and power of the respective rotational movements of the two elements. Other objects will appear from the following description and claims.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the preferred form of construction embodying the principles of my device; Figure 2 is a cross sectional view of Figure 1; and Figure 3 is a plan section of a part of my device, taken at the point indicated by 3—3 in Figure 2 and looking in the direction indicated by the arrows at 3—3.

Similar numerals refer to similar parts throughout the several views.

In my preferred construction, a shaft 11 (shown broken away in the drawings) is journaled in suitable bearings so that the said shaft 11 is freely rotatable. A wide pinion 12 is provided with internal threads 13 for a short distance from its upper end and these internal threads 13 engage and coact with external threads 14 with which the shaft 11 is provided for a portion of its length.

The shaft 11 is further provided with a keyway 15 of sufficient depth to extend toward the center of that shaft further than the grooves between the threads 14 do. This keyway 15 extends along the shaft 11, longitudinally thereof, being cut through the screw threads 14 for a portion of its length.

A wide pinion 16 is provided with an internally extending key or feather 17 which engages the keyway 15 and compels the shaft 11 to rotate with the pinion 16 while not interfering with free longitudinal movement of the pinion 16 upon the shaft 11. A washer 18 upon the shaft 11 separates the pinions 12 and 16.

A frame 19 has arms 20 provided with circular apertures 21 through which the shaft 11 passes and this frame 19 serves to maintain the pinions 12 and 16 in spaced relation to each other. Washers 22 upon the shaft 11 are interposed between the pinions 12 and 16 respectively and the frame arms 20. A stationary rod 23 passes through circular apertures 24 at each end of the frame 19 and prevents rotation of the frame 19 with the shaft 11, while permitting the frame 19 free longitudinal sliding movement thereon. The rod 23 is fixed to any convenient portion of the frame of the machine in which this device may be used.

Gear wheels 25 and 26 engage the pinions 12 and 16 respectively and may be either fixed upon or rotatably mounted upon a single shaft or upon separate shafts 27 and 28, as diagrammatically shown. The gear wheels 25 and 26 may be driven by separate motors or by separate portions of a single machine.

While the separate motors or machine parts that drive the gear wheels 25 and 26 respectively are operating at exactly the same speed, and in the same direction, it will be evident that there will be no longitudinal movement of the frame 19 upon the shaft 11, because both the externally threaded shaft 11 and the internally threaded pinion 12 are rotating in unison. Should the motor or machine part driving the gear wheel 25 be slowed down, however, without proportionate slowing of the motor or machine part driving the gear wheel 26, the shaft 11 will be rotated faster than the pinion 12 and will, assuming a left to right rotation of the shaft 11, force the frame 19 and its embraced pinions 12 and 16 in a downward direction upon the shaft 11. Should the speed of the gear wheel 25 be increased, instead of diminished, the movement of the frame 19 will be in the upward direction, because the internally threaded pinion 12 will then be in excess of the rotational speed of the shaft 11 and will screw upward upon that shaft.

Should the gear wheel 26 be driven at an increased rate over the rotational speed of the gear wheel 25, the result would be the same as described in the case of the gear wheel 25 having its speed diminished, and a diminishment in the speed of the gear wheel 26 would be exactly the same as an increase in the speed of the gear wheel 25. Whenever the gear wheels 25 and 26 rotate in unison, the frame 19 will remain stationary; whenever the gear wheel 25 rotates the fastest of the two, there will be an upward movement of the frame 19; and whenever the gear wheel 26 rotates the fastest of the two, there will be a downward movement of the frame 19. These movements of the frame 19 will be proportional in speed to the differences in the rates of rotation of the gear wheels 25 and 26.

It will be evident that an indicating dial or hand can readily be operated by the upward and downward movements of the frame 19 to indicate when there is variation of speed between the gear wheels 25 and 26, and also that this same movement of the frame 19 might be used to operate throttle valves or rheostats to control the speeds of the gear wheels 25 and 26 and maintain them at equality, or that this movement of the frame 19 might be utilized to control speed changing mechanism. I employ it for this latter purpose in my invention of transmission mechanism, subject of my application for Letters Patent, filed December 29th, Serial No. 433,930, and also, in modified form, in my invention of friction transmission mechanism, forming the subject of my application for Letters Patent Serial No. 374,683, filed April 17th, 1920.

When the gear wheel 25 is actuated by the vibrating or reciprocating movement of a member in one direction only and the gear wheel 26 is actuated by the reverse movement of the same vibrating or reciprocating member, the actuation of both the gear wheels 25 and 26 being in the same direction, differences in the forward and backward movements of the vibrating or reciprocating member will be indicated by movements of the frame 19. When the gear wheel 25 is actuated in one direction by the movement in one direction of a movable member and not actuated by the return movement of that movable member and when the gear wheel 26 is similarly actuated by the movement of a separate movable member, the difference between the total movements in the operative direction of the two movable members will be indicated by the movement of the frame 19. I employ this latter method of using this mechanical movement in my invention of indicating mechanism, forming the subject of my application for Letters Patent, Serial No. 294,947, filed May 5th, 1919, and in my invention of improved indicating mechanism, forming the subject of my application for Letters Patent, Serial No. 433,928, filed December 29th, 1920.

When the gear wheels 25 and 26 are driven at equal speeds and in opposite directions, the frame 19 will be moved in one or the other direction, according to whether the gear 25 or the gear 26 is driven in clockwise direction, at double the speed its movement would be if only one of the said gear wheels was being driven.

The pinions 12 and 16 may be independently placed upon the shaft 11, without the frame 19, and spaced apart from each other. In that case, when both the pinions 12 and 16 are driven in the same direction and at the same speed they will maintain their respective positions on the shaft 11. Differences in their respective speeds will cause them to approach or recede from each other. When driven in opposite directions, they will approach or recede from each other at a rate equal to the sum of their rotational speeds, proportional to the pitch of the screw threads 14. When thus made to approach each other, they will exert pressure upon any object between them equal to the sum of the power transmitted to each. Therefore, this movement is adaptable for die pressing and similar purposes.

In this preferred embodiment of my invention I have shown the internally thread-

ed element and the key or feather carrying element as wide faced pinions adapted to remain in mesh with the gear wheels 25 and 26 respectively throughout a considerable range of movement longitudinally of the shaft 11, and I have shown the threads upon the shaft 11 terminating at such points as would cause the internal threads of the pinion 12 to be out of engagement therewith when the limit of longitudinal movement with continued mesh with the gears 25 and 26 respectively was reached. It is, of course, evident that wide faced gears 25 and 26 might be used instead, with thin gears or pinions in place of the pinions 12 and 16, and that numerous other variations of construction might be employed without departing from the scope and spirit of my invention. I, therefore, do not wish to be limited to the construction shown and described.

I claim:

1. In a mechanical movement, the combination of a rotatable internally threaded element, a rotatable member provided with a feather, a shaft passing through openings in the said element and the said member, threads upon said shaft engaging with the internal threads of said element, a keyway in said shaft engaged by the said feather of the said member, means for retaining the said element and the said member in fixed position with relation to each other, means for preventing longitudinal movement of the said element and the said member upon said shaft, independent means for rotating the said member, and independent means for rotating the said element.

2. In a mechanical movement, the combination of a rotatable threaded shaft having a keyway therein, an internally threaded pinion in screw engagement with said shaft, a second pinion mounted upon said shaft slidably and provided with a feather engaging the said keyway in said shaft, a member slidably mounted upon said shaft and provided with arms embracing both the said pinions in such manner as to maintain said pinions in spaced relationship to each other, means adapted to prevent rotation of the said slidably mounted member, and independent means for rotating each of the said pinions.

CHARLES H. GILL.