P. CATUCCI.

MECHANICAL MOVEMENT.

APPLICATION FILED DEC. 2, 1911.

1,037,436.

Patented Sept. 3, 1912.

2 SHEETS—SHEET 1.

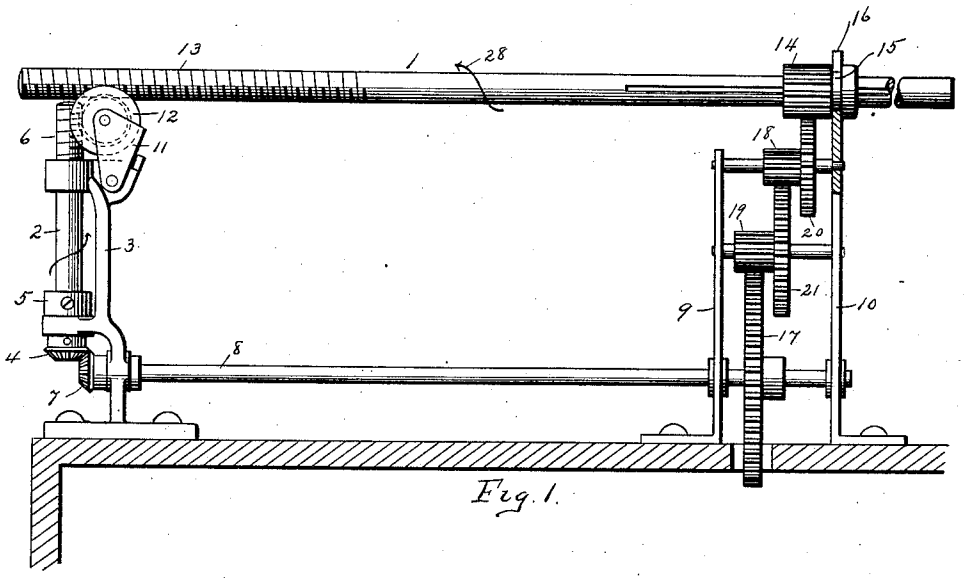

Fig. 1.

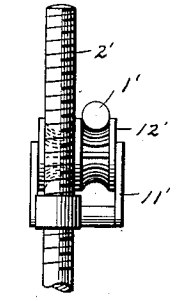

Fig. 3.

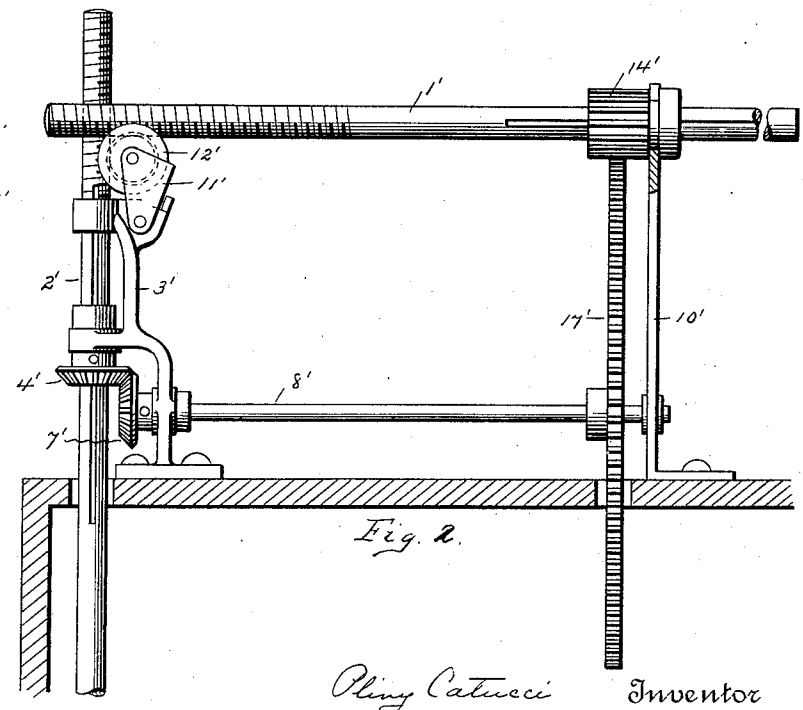

Fig. 2.

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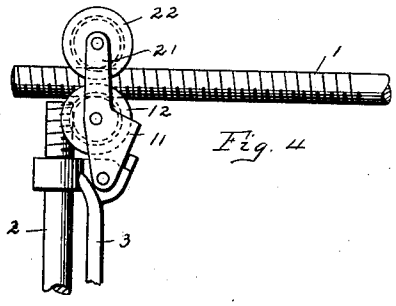

Fig. 4.

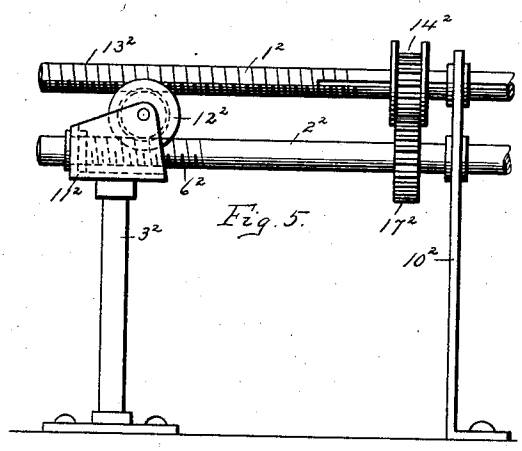

Fig. 5.

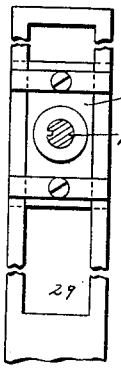

Fig. 8.

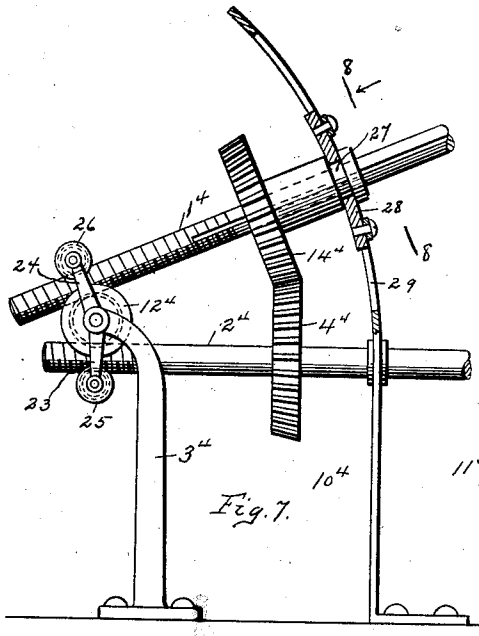

Fig. 7.

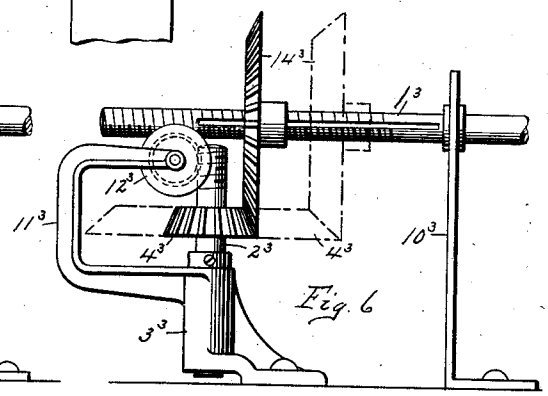

Fig. 6.

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UNITED STATES PATENT OFFICE.

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MECHANICAL MOVEMENT.

1,037,436. Specification of Letters Patent. Patented Sept. 3, 1912.

Application filed December 2, 1911. Serial No. 663,571.

To all whom it may concern:

Be it known that I, PLINY CATUCCI, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented a certain new and useful Mechanical Movement, of which the following is a specification.

The object of my invention is to provide a mechanical movement wherein two (2) intergeared rotating shafts will produce relative motions of translation in the direction of their axes, the rate of such motions of translation depending upon the relative rates of rotation of the shafts themselves.

In some forms which the mechanical movement may take the motions of translation of one of the shafts may be 0, while the rate of translation of the other shaft will be in one direction or the other, in the line of its own axis, at a rate dependent upon the relative rates of rotation of said shafts.

The relative rates of rotation as illustrated in the accompanying drawings are provided by intermeshing change gears and where such gears will produce the same rates of rotation in the shafts, then the rates of translation of each of the shafts will be 0.

Many changes of rates of rotation and rates of translation may be produced depending upon direction of the rotation of the shafts and the relative sizes of pitch diameters of the change gears, which connect the two shafts.

In the accompanying drawings, I have illustrated several different forms which my improved mechanical movement may take, but I wish it to be understood that these are by no means all of the forms which can be produced, and which would necessarily involve the principle of my invention.

Other modifications will naturally suggest themselves to skilled mechanics desiring to avail themselves of the principle of the improvement.

In the accompanying drawings, Figure 1 illustrates an embodiment of my improvement, wherein the two principal shafts are located at right angles to each other, both being driven from the same source of power, and wherein the motion of translation of one of the shafts is 0, while the motion of translation of the other shaft in the direction of its axis will depend upon the relative size of the interconnecting change gears. Fig. 2 illustrates a second form wherein the shafts are located relatively at right angles to each other, but provision is made for motion of translation in each of the shafts. Fig. 3 is a detached end elevation of the two shafts, and the connected worm driven mechanism. Fig. 4 illustrates a slight modification of the two forms just briefly described. Fig. 5 illustrates a form wherein the two shafts are arranged parallel to each other. Fig. 6 illustrates another form wherein the two shafts are connected by means of change bevel gears, and without the use of any other intermediate mechanism. Fig. 7 illustrates a still further form wherein the two shafts are angularly disposed and their angularity may be adjusted to any degree desired, within certain limits. Fig. 8 is a sectional view on line 8—8 of Fig. 7.

Similar reference numerals refer to like parts throughout the specification and drawings.

In the accompanying drawings, I have illustrated supports for the shafts of certain specific forms, but I wish it to be understood that these are by no means the necessary shapes for such supports, but that they are shown simply for the purpose of illustration rather than as involving the necessary principle for my invention.

In the forms shown in Fig. 1, the two shafts 1 and 2 are shown arranged at right angles to each other, the shaft 2 being vertically supported in the bearing support 3 and having at its lower end the miter gear 4, rigidly secured thereto. The collar 5 is secured to the shaft 2 in such a manner that the motion of translation of said shaft is 0. The upper end of the shaft 2 is provided with the worm threads 6 as shown. Meshing with the miter gear 4 is the second miter gear 7 mounted upon the horizontal shaft 8, said latter shaft being supported in bearings in the support 3 and also in the supports 9 and 10. At the upper end of the support 3, I provide a pivoted saddle 11 which carries the worm wheel 12 in position to mesh with the threads of the shaft 2. Resting upon this worm wheel 12 and meshing with the teeth thereof, is the shaft 1, which is threaded as at 13. Splined upon the shaft 1 is the gear wheel 14, the latter being provided with the groove 15, which

is received by the notched upper end 16 of the support 10; the construction being such that as the shaft 1 travels in the direction of its axis, the gear 14 is held in its position relative to the support 10.

The shaft 8 is provided with a gear wheel 17, and between the latter gear 17 and the gear 14 is a series of change gears, 18, 19, 20, 21. These change gears may be of such dimensions as to give any desired relative rates of rotation of the two shafts 1 and 2. Power may be applied to the shaft 8 through the gear 17, by means of an intermeshing gear, not shown.

From the construction thus far described it will be noted that if the shaft 2 is given a rotation in the direction of the arrow, while the shaft 1 is held against rotation, a motion of translation to the left will take place in said shaft 1. If the shaft 2 is given a rotation in the direction of the arrow surrounding shaft 1, the translation of the shaft 1 to the left will be increased in proportion to the rate of rotation thereof. If the two shafts 1 and 2 are connected by change gears of a character to give both shafts the same rates of rotation, no motion of translation of the shaft 1 will take place. If the change gears between the shafts 1 and 8 are of such a character as to rotate the shaft 1 in a direction opposite to that indicated by the arrow surrounding shaft 1 and at an equal rate of rotation to that given to shaft 1, no motion of translation will take place in the shaft 1, but if this rotation of shaft 1 opposite to the direction of the arrow is greater than the rate of rotation of the shaft 2, the shaft 1 will be translated in the direction of its axis to the right, and the rate of such translation will depend upon the difference in speed of the two shafts 1 and 2.

The above explanation as to rotational rate and directions of translation will apply to each of the succeeding forms, illustrative of the principle of my improved mechanical movement.

In Figs. 2 and 3, I have illustrated a slight modification in which both of the rotating shafts 1′ and 2′ are splined to their respective gears 14′ and 4′. In this case provision must be made for the two shafts 1′ and 2′ to pass each other, as shown in the drawings, and to provide for this, the worm gear 12′ is made double as illustrated in Fig. 3; that is, the shaft 1′ rests upon the upper side of one section of the worm gear, while the shaft 2′ bears upon the side of the other section of the worm gear. The relative rates of rotation of the shafts 1′ and 2′ are provided for through the gear 17′ mounted upon the horizontal shaft 8′, this motion being communicated to the gear 4′ by means of the miter gear 7′. In this form any means may be provided to limit the motion of translation of either of the shafts 1′ and 2′, and it will be understood that any modification of the rate of translation of one shaft will have this effect in correspondingly modifying the translation of the other shaft.

As a slight modification of either of the two forms just described, I may provide the saddle 11 or 11′, with an upward extension 21 and mounted in said upward extension a second worm wheel 22 meshing with the upper side of shaft 1. This is for the purpose of confining the shaft 1 in a single position relative to the shaft 2 and preventing the shaft 1 from jumping out or away from the worm wheel 12.

In Fig. 5 I have shown the two shafts 1^2 and 2^2 with their axes parallel to each other. The saddle 11^2 is mounted on the upper end of a standard 3^2 and carries with it a bearing for the shaft 2^2. The saddle 11^2 carries the worm wheel 12^2 which latter meshes with the worm threads 6^2 on the shaft 2^2. The shaft 1^2 bears with its threaded end 13^2 upon the worm wheel 12 as clearly illustrated. The shafts 1^2 and 2^2 are provided with the intermeshing change gears 14^2 and 17^2. The relative sizes of these two change gears will determine the relative rates of rotation of the two shafts 1^2 and 2^2, and also the rate and direction of translation of the shaft 1^2.

In Fig. 6, the structure is substantially the same as for all of the forms wherein the rotating shafts are at right angles to each other. However, the shaft 2^3 and the shaft 1^3 are provided with change bevel gears, the shaft 1^3 being supported in any convenient manner as in bearing support 10^3 and resting upon the worm wheel 12^3, the latter being carried in a U-shaped extension 11^3 from the bearing support 3^3. The relative rates of rotation of the shafts 1^3 and 2^3 are determined by the relative sizes of the bevel gears 14^3 and 4^3.

In Figs. 7 and 8, I have illustrated a form wherein the two shafts 1^4 and 2^4 are angularly arranged with respect to each other and provision is made for the adjustment of such angularity. In this case the worm wheel 12^4 is carried upon the upright support 3^4, and pairs of links 23 and 24 extend from the axis of the worm 12^4 and carry at their extremities the supplemental worm wheels 25 and 26. The shafts 1^4 and 2^4 extend between the supplemental worm-gears 25 and 26 and the main worm wheel 12^4, as clearly illustrated in the drawing.

As a means of intergearing the two shafts 1^4 and 2^4, I provide the bevel gears 14^4, and 4^4 providing the hub of the gear 14^4 with a groove 27 which latter takes into an arc shaped plate 28, the latter being adjustable in the arc shaped extension 29 of the bearing support 10^4. The shaft 1^4, it will be understood is splined within the hub of the gear 14^4 so that said shaft may have a motion of translation in the direction of its

axis, such motion depending, as heretofore described, upon the relative rates of rotation of the two shafts 1^4 and 2^4.

In each of the forms as above described, I wish it to be distinctly understood that wherever I have referred to change gears, I mean gears of a character and kind, to enable any relative rates of rotation to be given to the two main shafts, and that such rotations may be given in either direction according to the conditions of service required. The methods of interposing such change gears will readily suggest themselves to persons skilled in the art, and I deem it unnecessary to illustrate all of the ways in which such changes may be made. From what has been said, it will be clearly understood that the gist of my invention resides in the two screw threaded shafts being connected, not only by the worm wheel engaging the threads upon the said shafts, but also connected by means of change gears whereby the relative rates of rotation of the two shafts and the consequent rate of translation of one or both of said shafts may be provided for.

I claim,

1. In a mechanical movement the combination of a pair of shafts, gear connections between said shafts for producing simultaneous rotation thereof, and a motion of translation in the direction of the axis of one of said shafts.

2. In a mechanical movement, the combination of a pair of shafts, a gear connection between and for simultaneously rotating said shafts, a second gear connection between said shafts for producing a motion of translation in one of said shafts in the direction of its axis.

3. In a mechanical movement, the combination of a shaft having a worm thread thereon, a worm wheel meshing with said worm thread, a second worm threaded shaft meshing with said worm wheel and change gear connection between said shafts for producing rotation therein, and in conjunction with said worm wheel a longitudinal movement in one of said shafts.

4. In a mechanical movement, the combination of a pair of angularly disposed screw threaded shafts, a worm wheel engaging the screw threads of said shafts, intermeshing change gears mounted upon and connecting said shafts respectively, whereby the rotation of one of said shafts will produce a rotation and longitudinal translation of the other shaft.

5. In a mechanical movement, the combination of a pair of angularly disposed screw threaded shafts, a worm wheel meshing with the screw threads of each of said shafts, a gear wheel splined to one of said shafts, intermeshing change gears connecting said first named gear with the other shaft, whereby the rotation of said latter shaft will produce a simultaneous rotation and longitudinal translation of the other shaft.

6. In a mechanical movement the combination of a pair of angularly disposed screw threaded shafts, and a worm wheel, and means for maintaining said screw threads in constant engagement with the teeth of said worm wheel, means for producing rotation of said shafts at different relative rates and a consequent longitudinal translation of one of said shafts.

7. In a mechanical movement, the combination of two screw threaded shafts having angularly disposed axes, a driving gear wheel connected to one of said shafts, a driven gear wheel splined to the other shaft, change gears connecting said driving and driven gears, and a worm wheel engaging the threaded parts of each of said shafts, whereby their rotation will produce a translation of one of said shafts in the direction of its axis.

8. In a mechanical movement the combination of a shaft having a worm thread thereon, a worm wheel meshing with said worm thread, a second worm threaded shaft meshing with said worm wheel, means for maintaining said worm wheel in constant engagement with the threads of each of said shafts, and change gear connections between said shafts for producing rotation therein, and in conjunction with said worm wheel, a longitudinal movement in one of said shafts.

9. In a mechanical movement, the combination of a pair of angularly disposed screw threaded shafts, a worm wheel meshing with the screw threads of each of said shafts, means for maintaining said worm wheel in constant engagement with the screw threads of each of said shafts, a gear wheel splined to one of said shafts, intermeshing change gears connecting said first named gear with the other shaft, whereby the rotation of said latter shaft will produce a simultaneous rotation and longitudinal translation of the other shaft.

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