Sept. 29, 1925. 1,555,745

M. CARRASCO-SÁNCHEZ

MECHANICAL MOVEMENT

Filed April 3, 1925 3 Sheets-Sheet 1

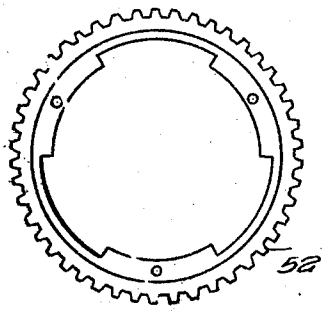

Fig. 7.

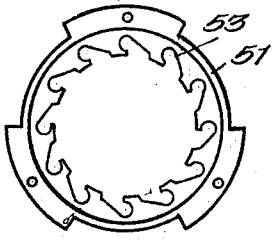

Fig. 8.

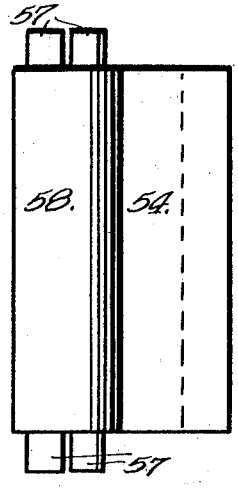

Fig. 9.

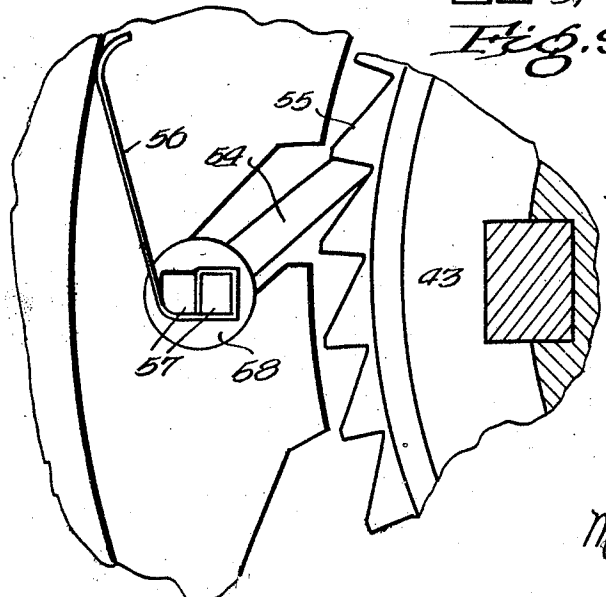

Fig. 6.

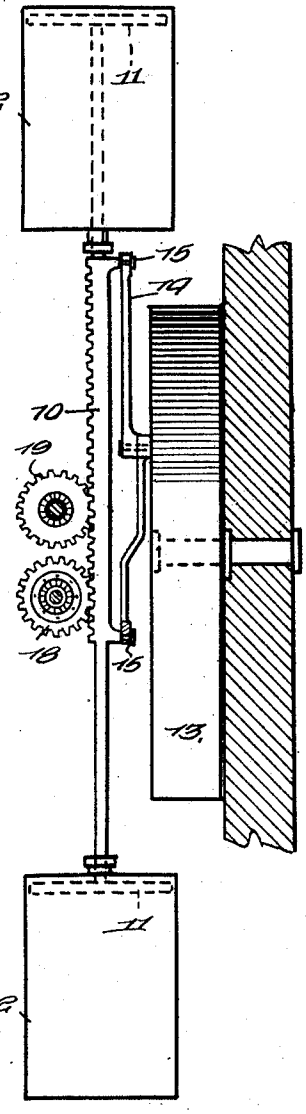

Fig. 1.

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By

Attorney

Sept. 29, 1925. 1,555,745

M. CARRASCO-SÁNCHEZ

MECHANICAL MOVEMENT

Filed April 3, 1925 3 Sheets-Sheet 2

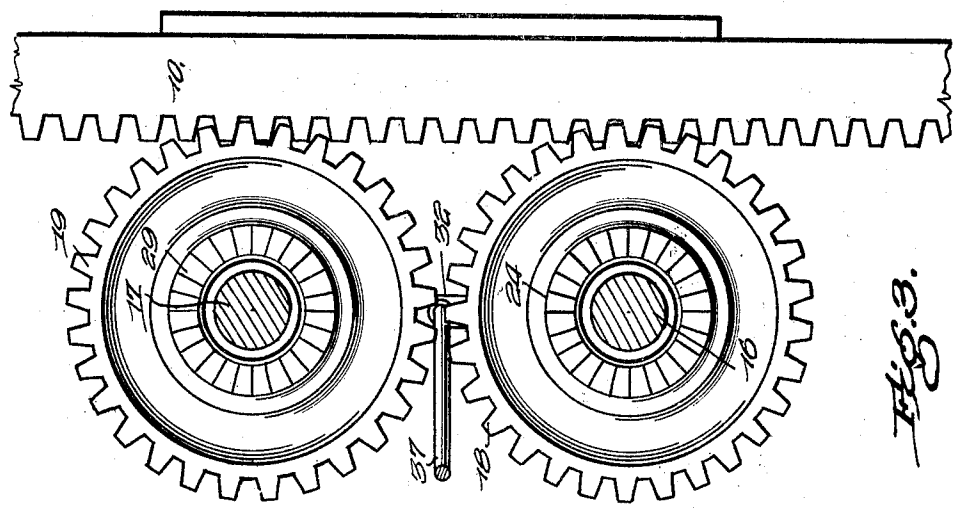

Fig. 3.

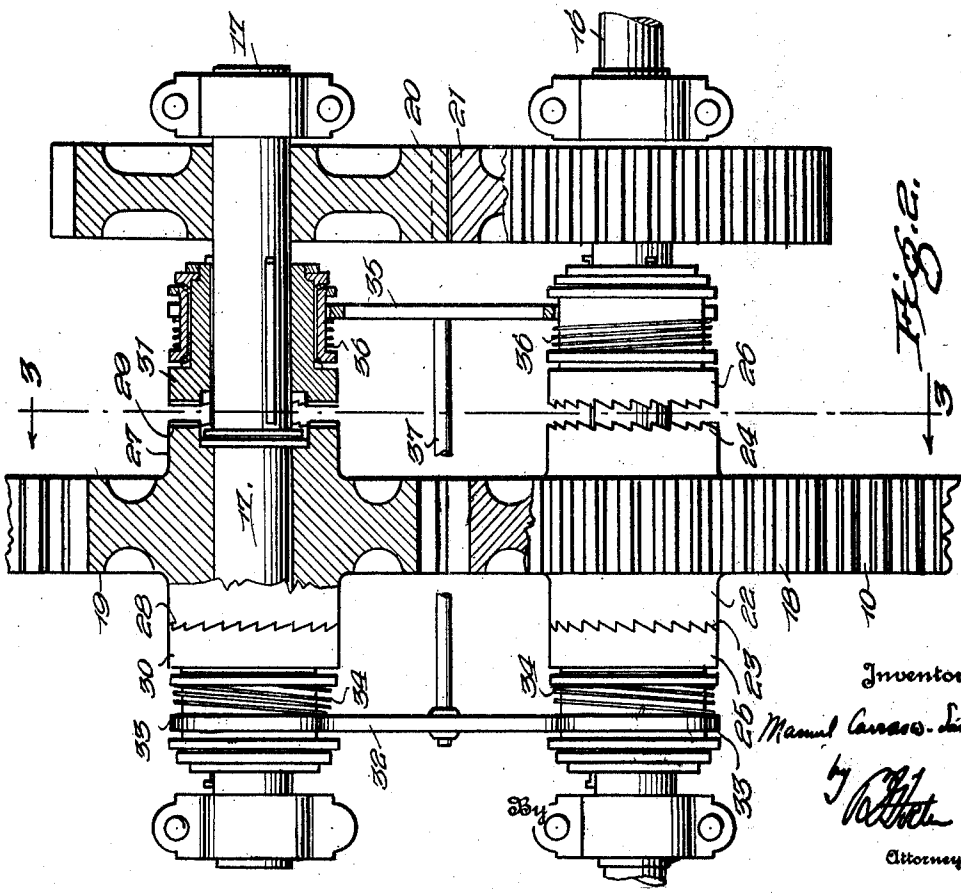

Fig. 2.

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MECHANICAL MOVEMENT

Filed April 3, 1925 3 Sheets-Sheet 3

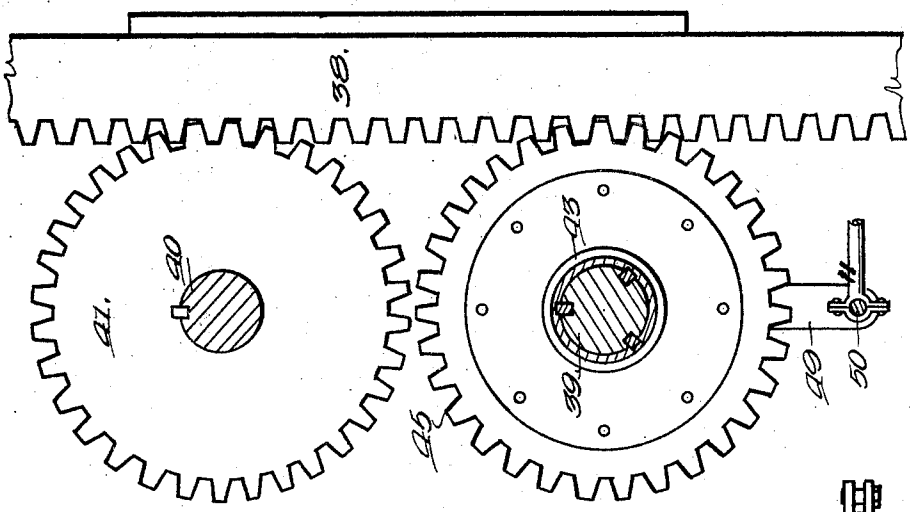

Fig. 5.

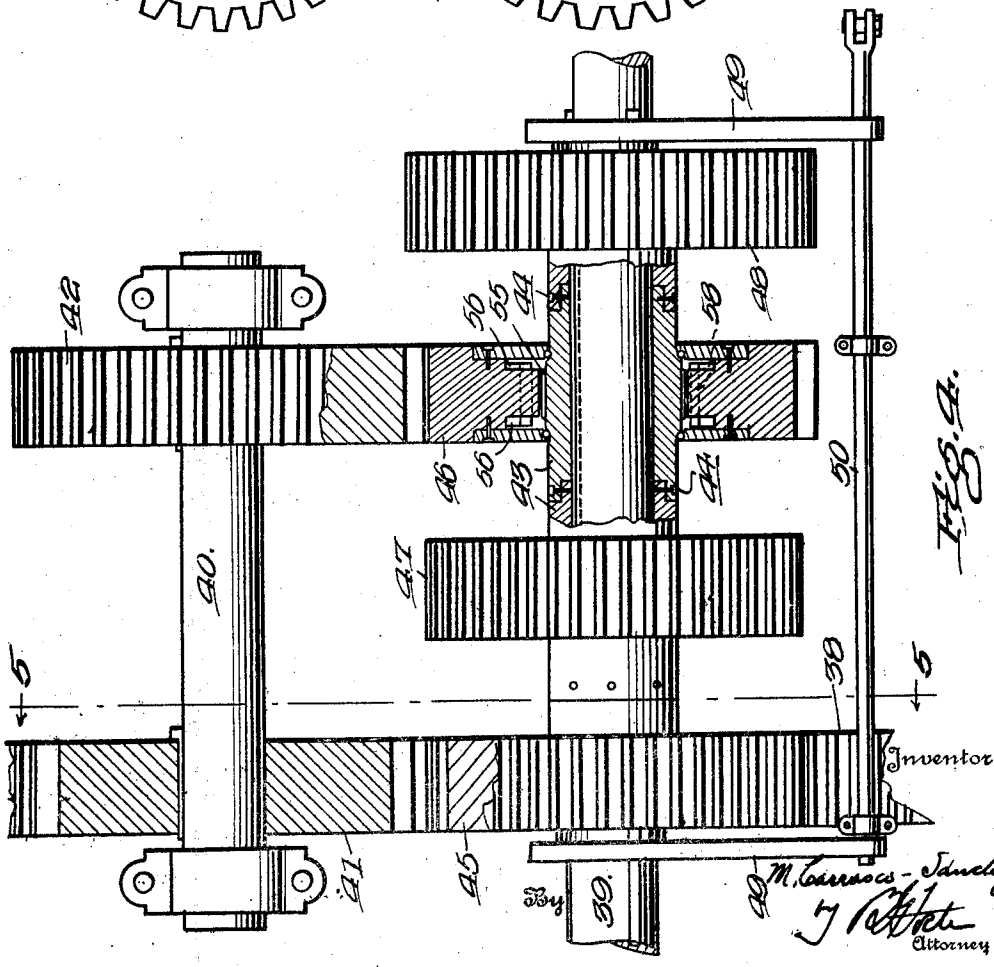

Fig. 4.

Patented Sept. 29, 1925. 1,555,745

UNITED STATES PATENT OFFICE.

MANUEL CARRASCO-SÁNCHEZ, OF WASHINGTON, DISTRICT OF COLUMBIA.

MECHANICAL MOVEMENT.

Application filed April 3, 1925. Serial No. 20,530.

To all whom it may concern:

Be it known that I, MANUEL CARRASCO-SÁNCHEZ, a subject of the King of Spain, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Mechanical Movements, of which the following is a specification.

The present invention relates to means for transforming reciprocatory into rotary motion, and the object is to provide novel, simple and practical mechanism by which a rotatable driven member may be continuously rotated in either of opposite directions from a reciprocatory driving member.

In the accompanying drawings:

Figure 1 is a view in elevation and somewhat diagrammatic in its character, illustrating the novel apparatus,

Figure 2 is a view partially in elevation and partially in section of the motion transmitting and transforming means,

Figure 3 is a sectional view on the line 3—3 of Figure 2,

Figure 4 is a view partially in elevation and partially in section of a different embodiment of the invention,

Figure 5 is a sectional view on the line 5—5 of Figure 4,

Figure 6 is a detail view showing the preferred form of pawl structure employed in the embodiment illustrated in Figures 4 and 5,

Figures 7 and 8 are detail views in elevation of the gear ring and ratchet elements of one of the gears shown in Figures 4 and 5,

Figure 9 is a detail face view of one of the pawls as illustrated in Figure 6.

The driving member of the apparatus is in the form of a reciprocatory rack 10 which may be driven by any suitable means, as for example, pistons 11 connected to its ends and operating in power cylinders 12. This rack is shown as a rigid bar but other forms may obviously be employed. A fly wheel, as 13, may be mounted adjacent to the rack and connected thereto by one or more pitmen 14. The utilization of two pitmen connected to the rack at separated points is advantageous as it tends to prevent the flexing of the rack.

Referring first to Figures 2 and 3 there is shown a driven member in the form of a rotary shaft 16 that is located transversely to the rack 10, and parallel to the driven shaft 16 is a stub or jack shaft 17. A gear 18 loosely journaled on the driven shaft 16 is in mesh with the rack 10, and another gear 19 is loosely journaled on the jack shaft 17 and is also in mesh with the rack 10. It will be evident that the two gears 18 and 19 rotate back and forth as the rack 10 is reciprocated. A gear 20, fixed to the jack shaft 17 is in mesh with a gear wheel 21 fixed to the driving shaft.

The hub 22 of the gear 18 is provided with annular rows of oppositely set ratchet teeth 23 and 24, and feathered on the driven shaft 16 are clutch heads 25 and 26, having teeth adapted respectively to interlock with the teeth 23 and 24 of the hub. It will be evident therefore that when one of these heads as 25 is in interfitting relation with the teeth 23 and as the rack is reciprocated, when the gear 18 rotates in one direction, the motion thereof will be transmitted through the head 25 to the driven shaft 16, but when the rack moves in the opposite direction, then the teeth 23 will ride over the teeth of the head 25 and the gear 18 will rotate idly upon the driven shaft 16. When, however, the head 26 is in its operative position the gear 18 will be clutched to the shaft 16, when it rotates in the opposite direction to its operative action through the head 25, and consequently the shaft 16 will be rotated in the reverse direction.

The gear 19 is also provided with a hub 27 having on its ends reversely disposed sets of ratchet teeth 28 and 29. On the jack shaft 17 are feathered clutch heads 30 and 31 corresponding to the clutch heads 25 and 26, and cooperating with the gear 19 to correspondingly effect rotation of the jack shaft 17 in either of opposite directions. The rotation of the jack shaft is transmitted through the gears 20 and 21 to the driven shaft 16. The clutch heads 25 and 30 are simultaneously movable into and out of action through a cross arm 32 having terminal yokes 33 slidably engaged with the heads 25 and 30 and bearing against coiled springs 34 that permit the heads to yield and thus allow the interlocking sets of teeth to ratchet over each other when moving in a reverse direction. The heads 26 and 31 are similarly connected by a cross arm 35 operating against coiled springs 36. The cross arms 32 and 35 are connected by a tie rod 37, by means of which they may be simultaneously

moved, thereby effecting the movement of one set of cross heads into action and the other out of action.

With this construction, it will be evident that as the rack is reciprocated the two gears 18 and 19 will be correspondingly rotated. With the arrangement as shown, when the rack moves upwardly, the gear 18 will be clutched through the head 25 to the shaft 16, and said shaft will be rotated. During this movement the gear 19 will be idle because the teeth 28 will ratchet over the teeth of the head 30. It will be noted that the heads 26 and 31 are now entirely out of action and are therefore idle. As the rack moves downwardly the gear 18 will be free and its teeth 23 will ratchet over the teeth of the head 25, but the teeth 28 will now be locked to the teeth of the head 30 and consequently the rack will transmit motion to the jack shaft 17, the gears 20 and 21 to the shaft 16, rotating it in the same direction as the gear 18 rotated it when the rack was moving downwardly.

If now the tie rod 37 and cross arms 32 and 35 are moved to carry the heads 25 and 30 out of their operative positions, the heads 26 and 31 will be moved into action, but these operate just oppositely to the heads 25 and 30. As a consequence the reciprocation of the rack will now cause a continuous reverse rotation of the driven shaft.

A different embodiment of the invention for effecting the same result is disclosed in Figures 4–9 inclusive. In this construction the driving rack is shown at 38, and the driven shaft is designated 39. A jack shaft 40 is provided with a gear 41 fixed thereto, and meshing with the rack 38. Another gear 42 is fixed to the jack shaft 40.

Feathered on the driven shaft 39 and longitudinally movable thereon is a sleeve 43 preferably made up of sections connected by screws or other fasteners 44. A pair of gear wheels is loosely journaled on the sleeve, these gear wheels being respectively designated 45 and 46. The said gears 45 and 46 are so located that they are simultaneously in mesh with the rack 38 and gear wheel 42. Another set of gears 47 and 48 are also loosely journaled on the sleeve 43, and when said sleeve is moved it can be brought into mesh respectively with the rack 38 and gear wheel 42 as the gears 45 and 46 move out of mesh. This movement of the sleeve may be accomplished by any suitable means, as for example by providing said sleeve with yokes 49 connected by a reciprocatory operating rod 50.

The gears may be made up of sections as shown in Figure 8, each gear consisting of an inner member 51 and an outer gear ring 52 suitably bolted to the inner member. Said inner member is provided with a series of recessed seats 53, in which are pivotally located pawls 54 that are adapted to engage ratchet teeth 55 that are carried by the respective sections of the sleeve 43. The various pawls 54 are preferably yieldingly held in engagement with the teeth 55 by suitable springs 56 having their inner ends engaged with stubs 57 projecting from the pivots 58 of the pawls.

It will be understood that the pawls 54 and teeth 55 of the gears 45 and 46 operate in one direction and that the corresponding pawls of the gears 47 and 48 are reverse so as to operate in the opposite direction. It will thus be clear that if the gear 45 is in mesh with the rack 38 and the gear 46 is in mesh with the gear 42, a reciprocation of said rack will cause the continuous rotation of the driven shaft 39 in one direction, but if the sleeve 43 is shifted to bring the gear 47 into mesh with the rack 38 and the gear 48 into mesh with the gear 42 the direction of rotation of the shaft 39 will be reversed.

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.

What I claim, is:

1. In motion transformation mechanism of the character set forth, the combination with a shaft to be driven and a jack shaft alongside the same, of a pair of gears on the shafts, a reciprocatory driving rack in mesh with the gears, a pair of gears on the shafts and in direct mesh with each other, and means for clutching certain of said gears alternately to the said shafting to cause said first mentioned shaft to be rotated continuously in either of opposite directions upon the reciprocation of the rack.

2. In motion transformation mechanism of the character set forth, the combination with a shaft to be driven and a jack shaft alongside the same, of a pair of non-intermeshing driving gears, one on each shaft, a reciprocatory driving rack in mesh with the gears, a pair of gears that directly intermesh, one on each shaft, sets of reverse ratchet mechanisms for connecting certain of said gears to the said shafting, and means for throwing one or the other of said sets into action to cause the rack through said gears and shafts to rotate the said shaft to be driven in one direction or the other.

3. In motion transformation mechanism of the character set forth, the combination with a rotary driven shaft, of a reciprocatory driving rack, a jack shaft, means for effecting intermittent rotation of the driven shaft in either of opposite directions by the

rack, means for effecting rotation of the jack shaft from the rack in either of opposite directions and a pair of gears, one on each shaft and in direct mesh with each other for transmitting such motion to the driven shaft.

4. In motion transformation mechanism of the character set forth, the combination with a rotary driven shaft, of a reciprocatory driving rack, a jack shaft, a pair of gears on the driven shaft and jack shaft meshing with the rack, a pair of intermeshing gears on the driven shaft and jack shaft, a set of ratchet mechanisms for driving the shafts by the gears of the first set in predetermined directions, and a set of ratchet mechanisms for driving said shafts by the gears of the first set in reverse directions to cause the driven shaft to be rotated in either of opposite directions on the reciprocation of the rack.

5. In motion transformation mechanism of the character set forth, the combination with a rotary driven shaft, of a reciprocatory driving rack, a jack shaft, a pair of gears on the driven shaft and jack shaft meshing with the rack, a pair of intermeshing gears on the driven shaft and jack shaft, a set of ratchet mechanisms for driving the shafts by the gears of the first set in predetermined directions, a set of ratchet mechanisms for driving said shafts by the gears of the first set in reverse directions to cause the driven shaft to be rotated in either of opposite directions on the reciprocation of the rack, and means for shifting the said sets of ratchet mechanisms to cause one or the other to be active.

In testimony whereof, I affix my signature.

MANUEL CARRASCO-SANCHEZ.